3.1

WAC 463-60-302 Natural Environment - Earth.

(1) The applicant shall provide detailed descriptions of the existing environment, project impacts, and mitigation measures for the following:

(a) Geology.

(b) Soils.

(c) Topography.

(d) Unique physical features.

(e) Erosion/enlargement of land area (accretion).

(2) The application shall show that the proposed energy facility will comply with the state building code provisions for seismic hazards applicable at the proposed location.

[Statutory Authority: RCW 80.50.040 (1) and (12). 04-21-013, amended and recodified as § 463-60-302, filed 10/11/04, effective 11/11/04. Statutory Authority: RCW 80.50.040. 92-23-012, § 463-42-302, filed 11/6/92, effective 12/7/92.]

SECTION 3.1 EARTH
(WAC 463-60-302)

3.1.1 INTRODUCTION

The proposed Pacific Mountain Energy Center (PMEC) and associated pipeline would be constructed within the North Port Marine Industrial Park at the Port of Kalama north of the City of Kalama, within Cowlitz County, Washington. Existing conditions, potential impacts, and, where appropriate, mitigation measures are discussed below. The following sections include detailed evaluation of geology, soils, topography, unique physical features, and erosion/enlargement of the land area.

Site-specific measures have been identified to mitigate potential hazards. With standard and site-specific mitigation measures, impacts on the natural earth environment from the construction and operation of the PMEC and associated pipeline are expected to be minor.

3.1.2 GEOLOGY

Geologic information on the PMEC site was gathered from readily available resources, including:

- Local and regional geologic maps (DGER,2005; Evarts, 2002; and Walsh et al., 1987),
- Topographic maps (USGS, 1953 & 1990 and USACE, 1940),
- Soil survey of Cowlitz County (USDA, 1988),
- Water supply bulletin for western Cowlitz County (Myers, 1970),
- Environmental assessments of the PMEC site (Parametrix, 1995 and Hart Crowser, 1995a & 1995b),
- Geotechnical investigation of the development site (PBS, 2006), and
- Geotechnical investigation of adjacent property (Dames & Moore, 1974).

The PMEC site is situated in a relatively narrow valley north of the Portland Basin in the Willamette Lowland. It is located on the alluvial terrace that forms the east bank of a northwest to southeast trending reach of the Columbia River. The low mountains bounding the valley to the east are underlain by Oligocene and Eocene andesite flows with younger Pliocene/Quaternary age continental sedimentary rocks present locally (Walsh et al, 1987; Evarts, 2002). The valley floor in the site vicinity is underlain by Holocene alluvial deposits of silt, sand, and gravel. These unconsolidated deposits have been deposited on flood plains, alluvial fans and terraces of the Columbia River and its tributaries, including the nearby Kalama River. Quaternary landslide debris is also present in areas of steeper topography underlain by the Oligocene/Eocene volcanic rocks (Figure 3.1-1).

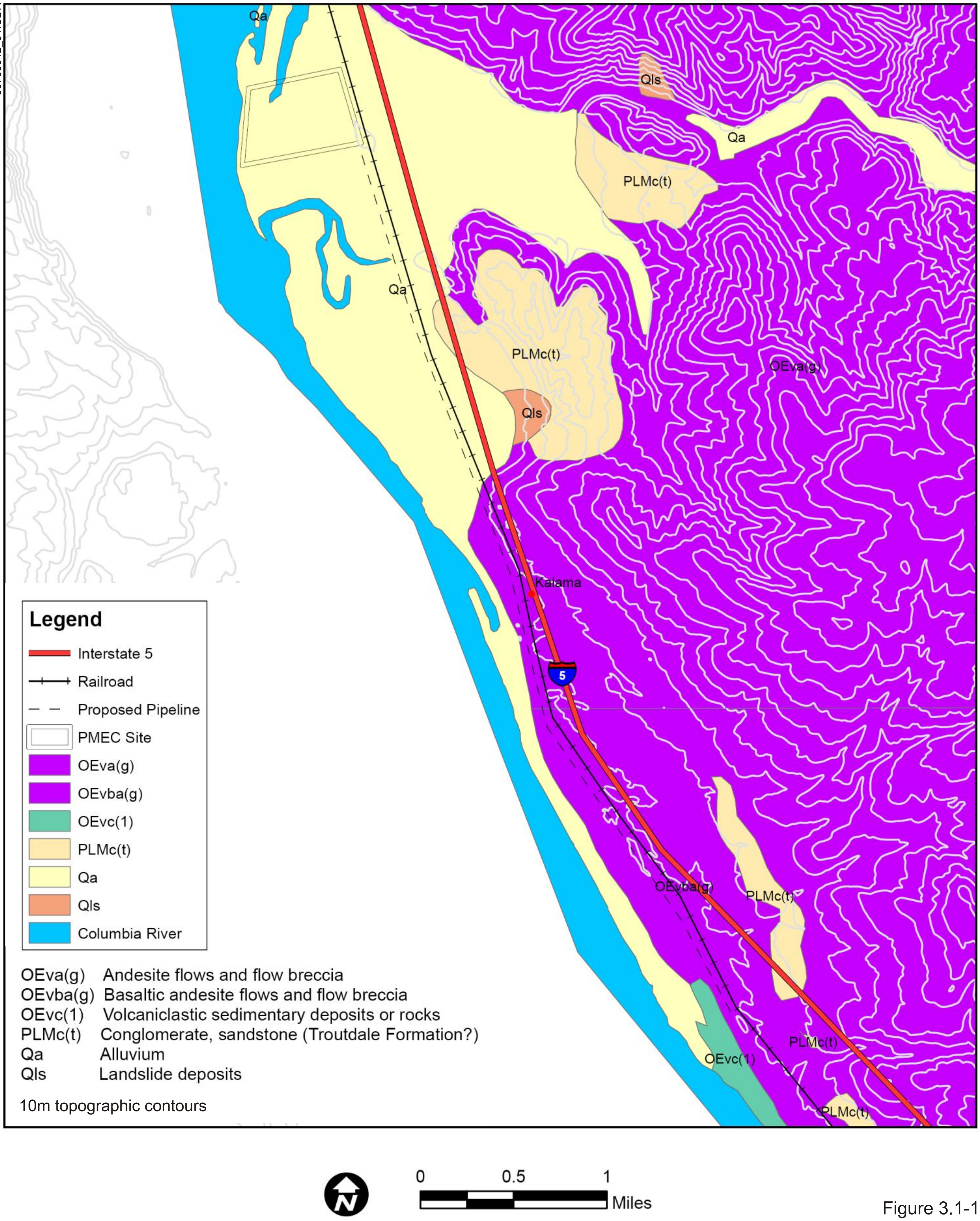

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Figure 3.1-1
Geology

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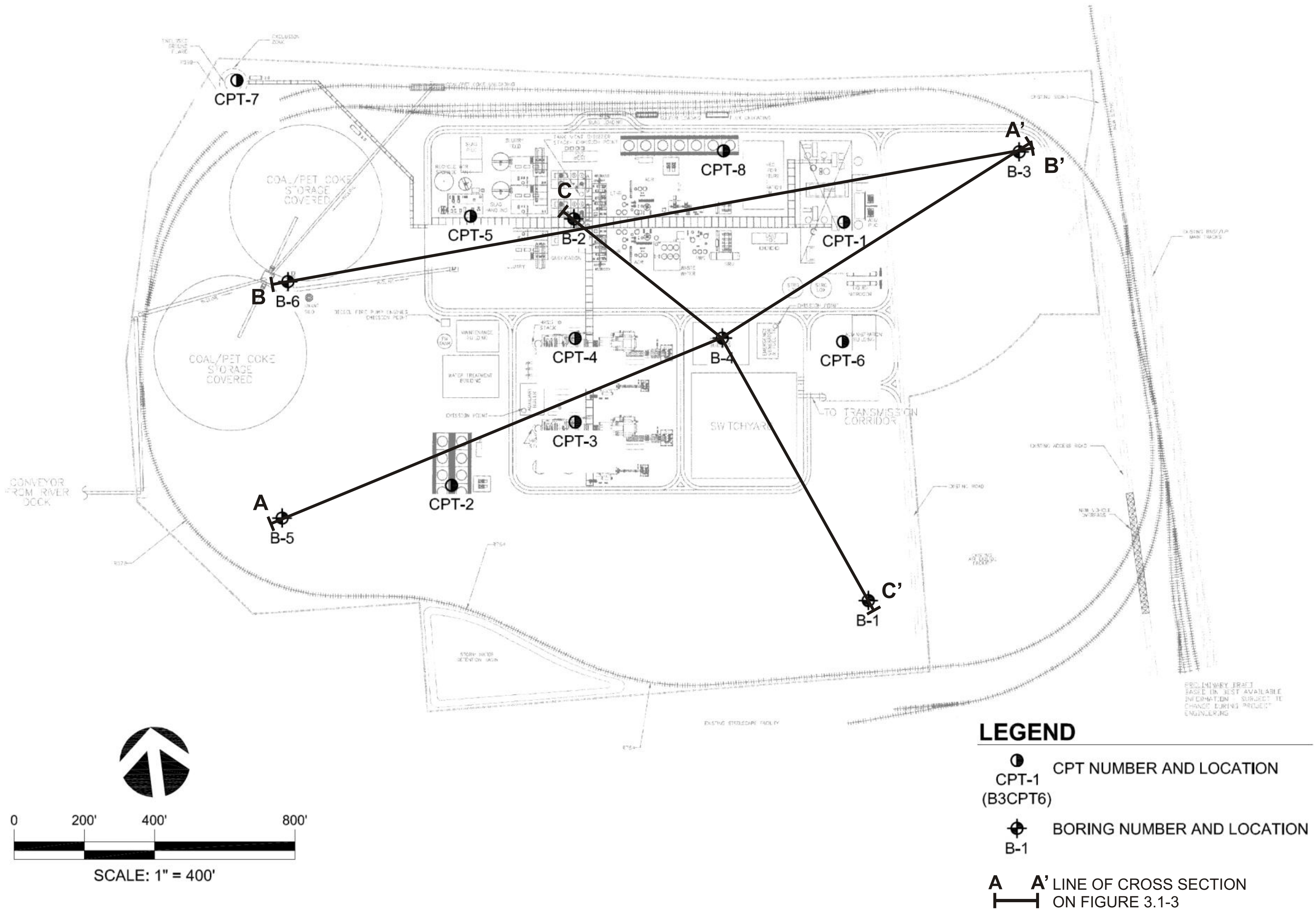
Prior to 1979, the proposed PMEC site was owned by the BNSF Railroad and was undeveloped range land used primarily for cattle grazing. The Port of Kalama acquired the site in April 1979. Following the eruption of Mount Saint Helens in 1980, the United States Army Corps of Engineers (USACE) conducted emergency dredging of the Columbia River, and the spoils from this activity were deposited at the site as fill. Since 1980, the site continued to receive spoils from regular maintenance dredging of the Columbia River for safe navigation (Hart Crowser, 1995a). As of 1995, dredge spoils constituted a layer of fill ranging from approximately 6 to 16 feet thick draped across the site (Parametrix, 1995 and Hart Crowser, 1995b).

The dredge spoils consist principally of fine- to coarse-grained sand with varying amounts of silt and entrained pumice. The placement of this material was estimated to have raised the site ground surface by upwards of 10 feet or more in certain areas. The topography at the site has remained relatively flat over the course of the dredging operations. Site elevations range from a high of approximately 24 feet above mean sea level (ft-MSL) to as low as 18 ft-MSL near the bank of the Columbia River (Parametrix, 1995), and are approximately 22 ft-MSL across the site. Beneath the dredged fill are Quaternary alluvial deposits composed principally of silt with some clay and lentincular, sand-dominated interbeds containing gravel, organic matter, and volcanic ash. These alluvial deposits may be greater than 300 feet thick near the mouth of the Kalama River and are underlain by basalt bedrock of the Columbia River Group at depth (Evarts, 2002 and Parametrix, 1995). The alluvium is bounded by Tertiary sedimentary and volcanic/volcaniclastic rocks that form relatively steep walls on both sides of the Columbia River (Evarts, 2002).

The subsurface geology and geotechnical conditions in the vicinity of the proposed PMEC were investigated in geotechnical studies for the site by PBS Engineering and Environmental (PBS, 2006) and nearby property directly south of the Kalama River by Dames & Moore (D&M, 1976). The Dames & Moore investigation included the completion of numerous drilled and probe boreholes and indicated that the native soils consist of approximately 22 feet of silt with discontinuous loose sand interbeds 1 to 5 feet thick. Underlying the silt is loose to dense fine to medium sand with varying amount of gravel. Gravel content typically increases with depth. Similar soils were encountered beneath the site in the limited investigation by PBS (PBS, 2006) and are likely present at depth along the gas pipeline route. The location of the PBS soil borings and lines of three geologic cross-sections across the site are presented in Figure 3.1-2, and the geologic cross-sections are presented in Figure 3.1-3.

The preliminary geotechnical analysis performed by PBS (PBS, 2006) indicates that the near surface soils up to a depth of 50 feet are potentially liquefiable under the design seismic event. Post-liquefaction vertical settlements were calculated to be on the order of 4 to 6 inches. Consolidation tests to evaluate the settlement characteristics of the near surface soft soils indicate the potential for large magnitudes and time required for the primary and on-going secondary consolidation settlements.



SOURCE: Plan and boring locations from PBS, 2006

Figure 3.1-2

Site Plan and Cross Section Location Map

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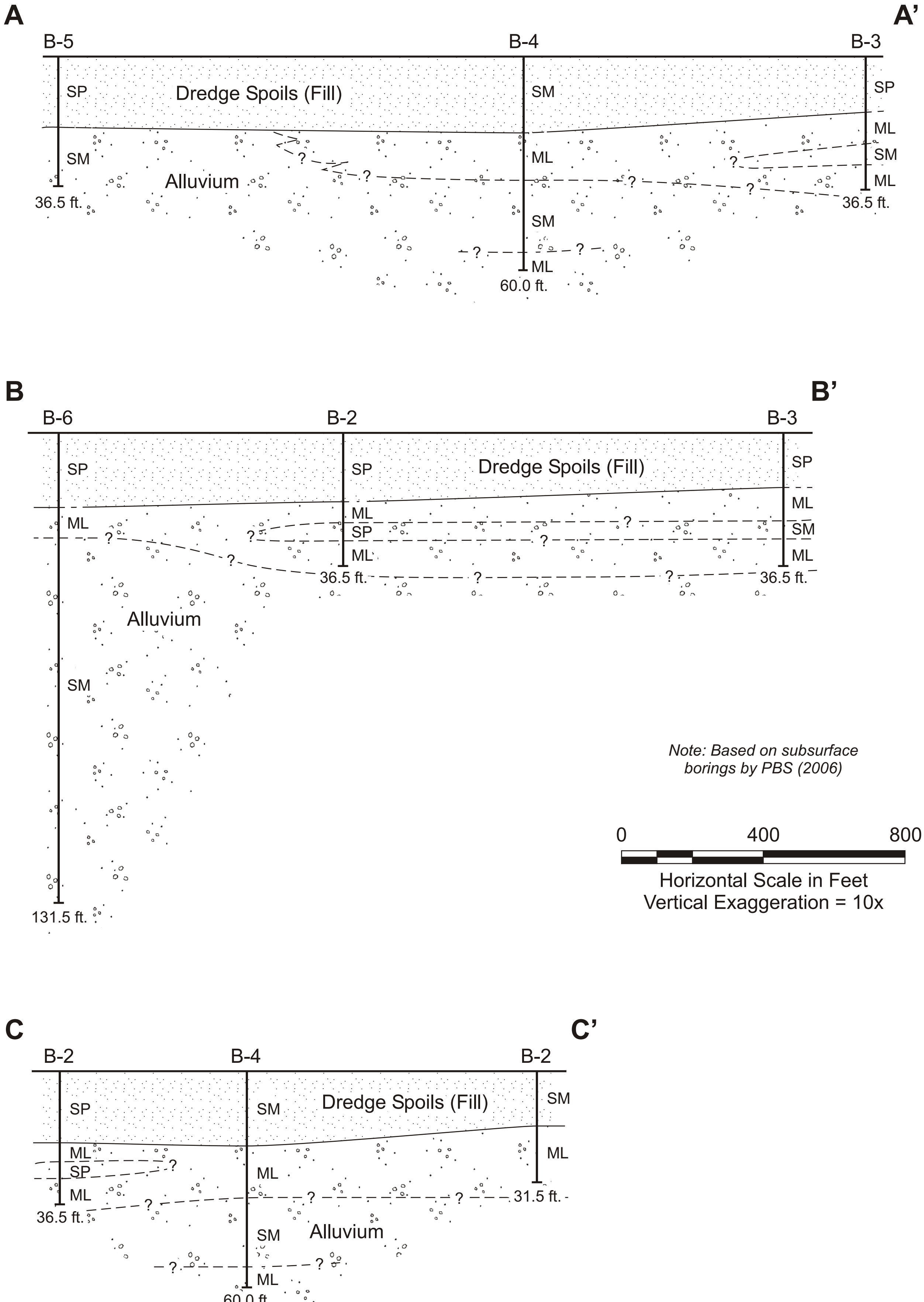

Figure 3.1-3
Geologic Cross Sections

The shallow hydrogeology of the site vicinity is relatively simple. Precipitation is infiltrated into the groundwater system by percolation or else runs off as surface discharge (Myers, 1970). Groundwater has been encountered beneath the site at depths ranging from 8 to 20 feet below ground surface (bgs) (Hart Crowser, 1995a/1995b). Groundwater table elevations are likely influenced by the stage of the Columbia and Kalama rivers, given the site's proximity to the rivers and associated tidal flats. Groundwater flow is also influenced by the rivers, and is therefore inferred to be westerly beneath the site, parallel to the drainage of the Kalama River into the Columbia.

The geologic structure of the site area consists of gentle (typically less than 20 degrees) westerly dips in the Oligocene/Eocene volcanic rocks. Several northeast trending faults are located between Kalama and Woodland that displace these rocks. The Kalama structural zone, one of a series of northwest trending zone of northwest to north-south trending right-later strike slip faults at the north margin of the Portland Basin, is inferred to underlie the Columbia River (Evarts, 2002).

3.1.3 SEISMICITY

Strong ground motions affecting the site potentially can be generated from earthquakes on several regional seismic sources. Earthquakes are the result of sudden releases of built-up stress within the tectonic plates that make up the earth's surface. The stresses accumulate because of friction between the plates as they attempt to move past one another. The movement can be between plates such as when one plate moves over another, as in subduction zones or within the plates themselves. Earthquakes in the Pacific Northwest can originate from four different types of sources: (1) interplate earthquakes on the Cascadia Subduction Zone (CSZ), (2) intraplate earthquakes within the subducting Juan de Fuca plate as it sinks and breaks up below the North American plate, (3) shallow crustal earthquakes on faults within the North American plate, and (4) volcanic earthquakes such as those associated with the eruption of Mount St. Helens. These sources are depicted on Figures 3.1-4 and 3.1-5. The largest historical earthquakes in Washington, southern British Columbia, and northern Oregon are shown on Figure 3.1-6 and summarized in Table 3.1-1

The historic record of seismicity in the Pacific Northwest (approximately 150 years) is insufficient to indicate whether the CSZ has generated or is capable of generating a great earthquake of magnitude (M8 or greater). There has been a low rate of seismicity and it was originally thought not to be capable of generating great earthquakes. In the late 1980's, Rogers (Rogers, 1988) and Heaton and Hartzell, (Heaton and Hartzell, 1986) inferred that a moment magnitude M9.1 CSZ earthquake could occur that would rupture the entire 900 km length of the Juan de Fuca plate between the Explorer and Gorda plates. Geologic and geodetic studies during the last 20 years indicate that great (M8 or greater) earthquakes have occurred on the CSZ during the Holocene and could occur during the lifetime of the PMEC (Atwater, 1987a,b, 1992; Carver and Burke, 1987; Darienzo and Peterson, 1987, 1990; Grant and McLaren, 1987; and Peterson and Darienzo, 1996; Savage et al., 1991; Adams, 1996; Atwater, 1996; Nelson and Personious, 1996).

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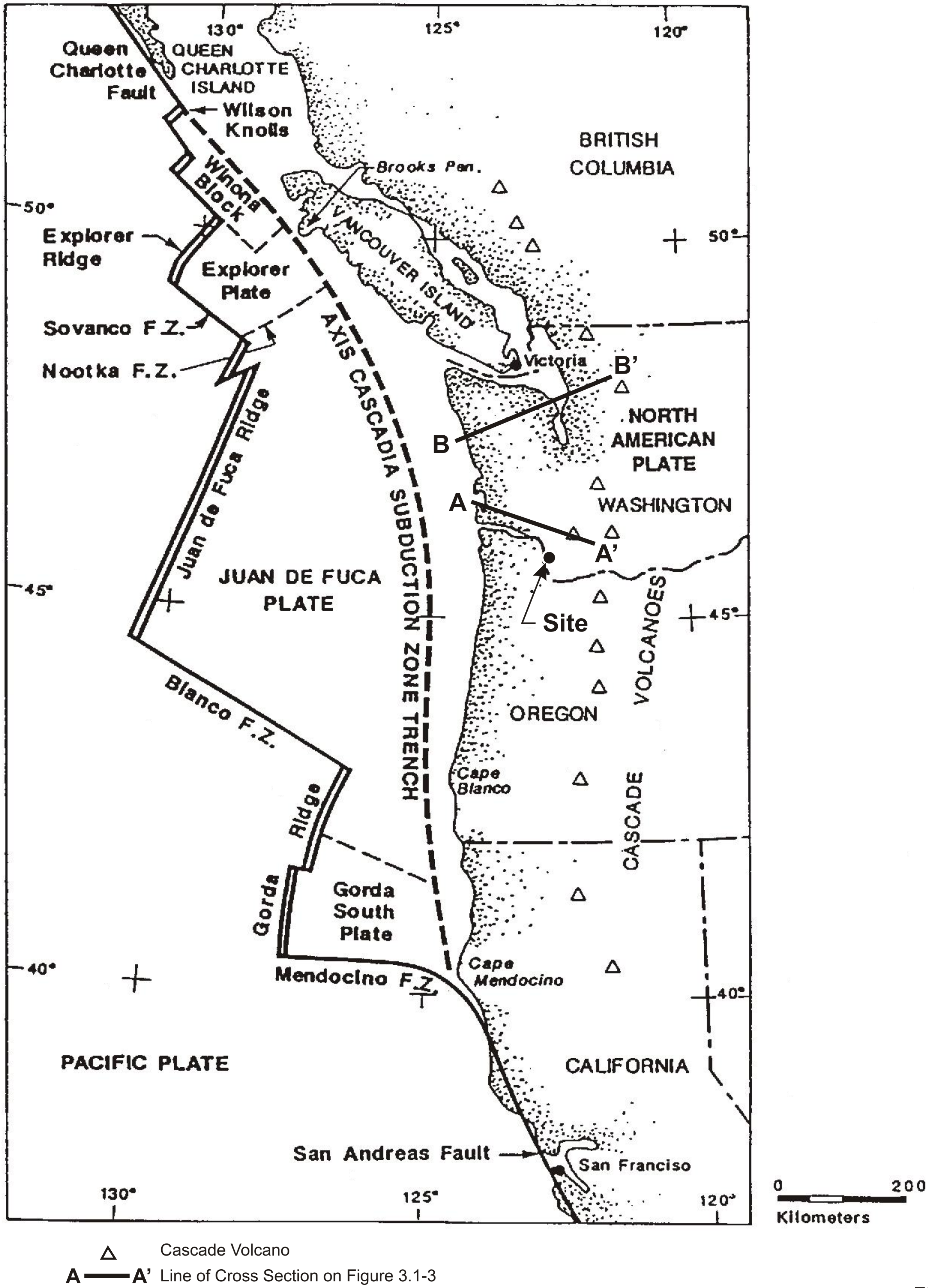

Modified from Washington Public Power Supply System (1988) (after Riddihough, 1984).

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Figure 3.1-4

Tectonic Setting of the Cascadia Subduction Zone

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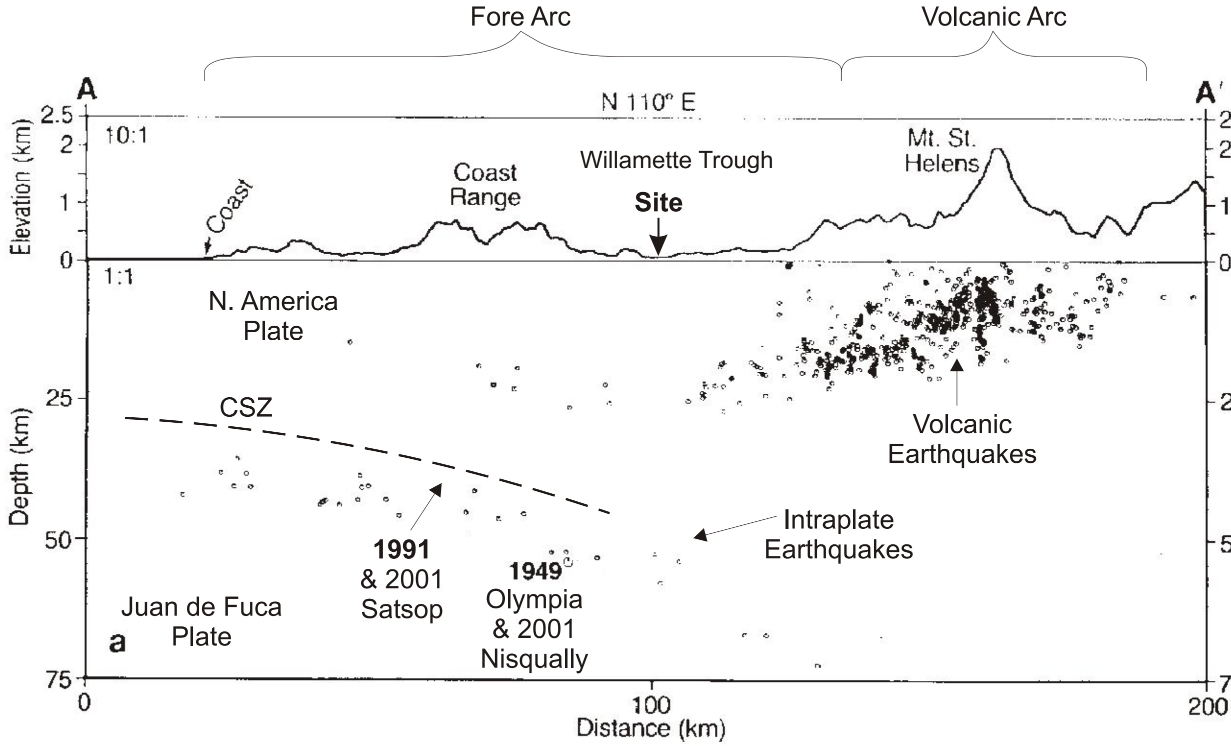
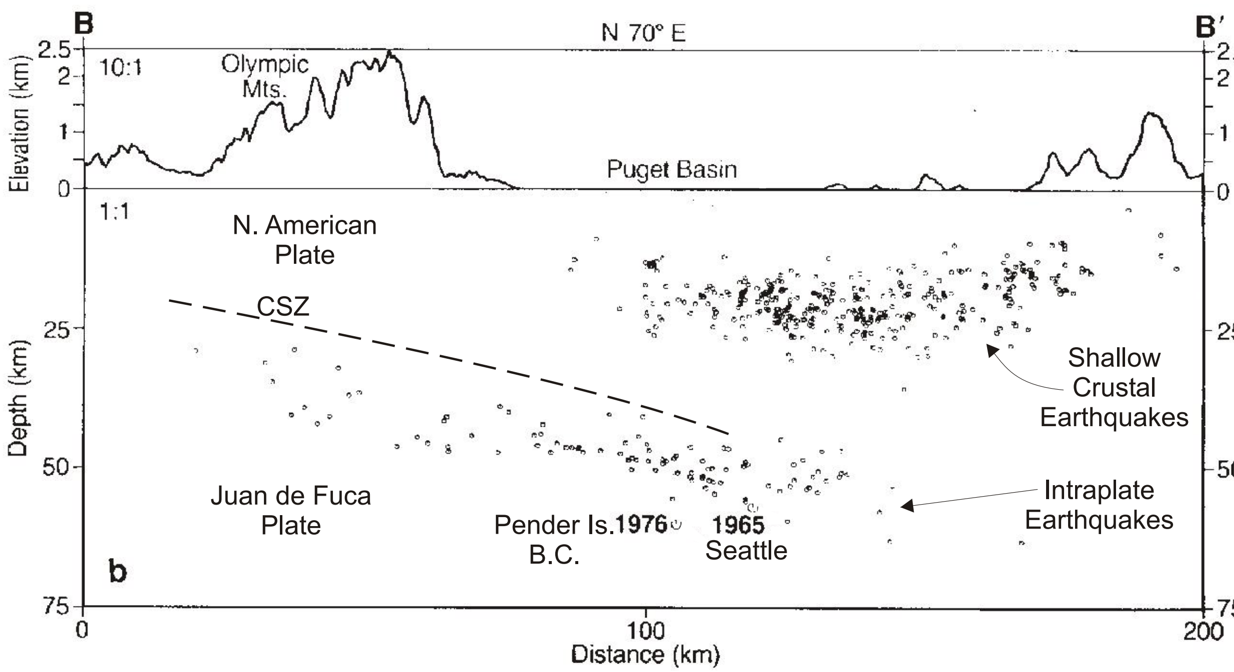


a. Southwestern Washington Cross Section A-A'



b. Northwestern Washington Cross Section B-B'

CSZ = Cascadia Subduction Zone

See Figure 3.1-5 for cross section locations.

Figure 3.1-5

Cross Sections of Earthquake Hypocenters Beneath Western Washington

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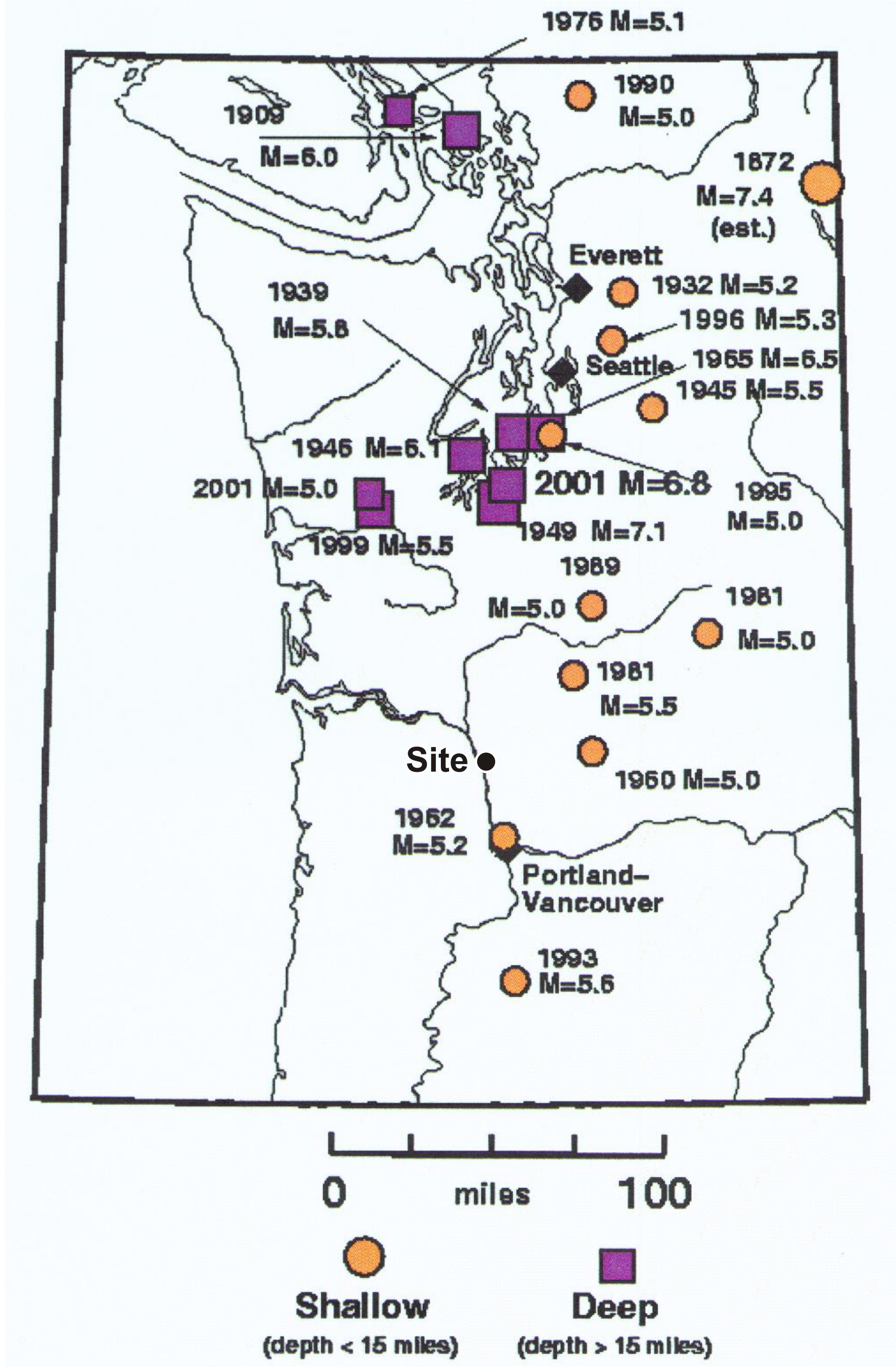

Source: University of Washington

Figure 3.1-6

Epicenters and Dates of
M 5.0 Pacific Northwest Earthquakes

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TABLE 3.1-1
LARGEST KNOWN EARTHQUAKES FELT IN WASHINGTON[a]

Year	Date	Time (PST)	North Latitude	West Longitude	Depth (km)	Mag (felt)[b]	Mag (inst)[c]	Max. Mod. Mercalli Intensity	Felt Area (sq km)	Location
1872	12-14	2140	48°48'00"	121°24'00"	shallow	7.3	None	IX	1010000	North Cascades
1877[d]	10-12	1353	45°30'00"	122°30'00"	shallow	5.3	None	VII	48000	Portland, Oregon
1880	12-12	2040	47°30'00"	122°30'00"			None	VII		Puget Sound
1891	11-29	1521	48°00'00"	123°30'00"			None	VII		Puget Sound
1893	3-6	1703	45°54'00"	119°24'00"	shallow	4.7	None	VII	21000	Southeastern Washington
1896	1-3	2215	48°30'00"	122°48'00"		5.7	None	VII		Puget Sound
1904	3-16	2020	47°48'00"	123°00'00"		5.3	None	VII	50000	Olympic Peninsula, eastside
1909	1-11	1549	48°42'00"	122°48'00"	deep	6	None	VII	150000	Puget Sound
1915	8-18	605	48°30'00"	121°24'00"		5.6	none	VI	77000	North Cascades
1918[d]	12-6	41	49°37'00"	122°55'00"		7	7	VIII	650000	Vancouver Island
1920	1-23	2309	48°36'00"	123°00'00"		5.5	none	VII	70000	Puget Sound
1932	7-17	2201	47°45'00"	121°50'00"	shallow	5.2	none	VII	41000	Central Cascades
1936	7-15	2308	46°00'00"	118°18'00"	shallow	6.4	5.75	VII	270000	Southeastern Washington
1939	11-12	2346	47°24'00"	122°36'00"	deep	6.2	5.75	VII	200000	Puget Sound
1945	4-29	1216	47°24'00"	121°42'00"		5.9	5.5	VII	128000	Central Cascades
1946	2-14	1918	47°18'00"	122°54'00"	40	6.4	6.3	VII	270000	Puget Sound
1946[d]	6-23	913	49°48'00"	125°18'00"	deep	7.4	7.3	VIII	1096000	Vancouver Island
1949	4-13	1155	47°06'00"	122°42'00"	54	7	7.1	VIII	594000	Puget Sound
1949[d]	8-21	2001	53°37'20"	133°16'20"		7.8	8.1	VIII	2220000	Queen Charlotte Isl., B.C.
1959	8-5	1944	47°48'00"	120°00'00"	35	5.5	5	VI	64000	North Cascades, east side
1959[d]	8-17	2237	44°49'59"	111°05'	10-12	7.6	7.5	X	1586000	Hebgen Lake, Montana
1962[d]	11-5	1936	45°36'30"	122°35'54"	18	5.3	5.5	VII	51000	Portland, Oregon
1965	4-29	728	47°24'00"	122°24'00"	63	6.8	6.5	VIII	500000	Puget Sound
1981	2-13	2209	46°21'01"	122°14'66"	7	5.8	5.5	VII	104000	South Cascades
1983[d]	10-28	606	44°03'29"	113°51'25"	14	7.2	7.3	VII	800000	Borah Peak, Idaho
1990[g]	4-14				3		5.2	VI		Deming
1993[d]	3-25	535	45°02'00"	122°36'26"	16		5.6	VII		Scotts Mills, Oregon
1995[f]	1-29	1511	47°23'24"	121°21'36"	20		5	V		Robinson Pt., Vashon Island
1996[e]	5-02	2104	47°45'36"	121°51'00"	7		5.3			Duvall
1999[e]	7-02	0543	47°'33	123°'49"	41		5.5 – 5.9	VI		Satsop
2001[e]	2-28	1054	47° 9’9”	122° 43’11”	52		6.8	VIII		Nisqually
2001[e]	6-10	0519	47° 9’58”	123 °30’21”	41		5.0	V		Satsop

(a) Data from Noson et al. (1988); EERI (1993) except where noted otherwise

(b) Mag (felt) = an estimate of magnitude, based on felt area; unless otherwise indicated, it is calculated from Mag (felt) = -1.88 + 1.53 log A, where A is the total felt area in km²; from Toppozada (1975).

(c) Mag (inst) = instrumentally determined magnitude; refer to references listed in the original Table 2 of Noson et al. (1988), or (e) below, for magnitude scale used.

(d) Earthquakes with epicenters outside Washington.

(e) Data from University of Washington Geophysics Program via http://www.geophys.washington.edu/seis/.

(f) Dewberry and Crosson (1996)

(g) Dragovich et al, (1997b)

Geologic evidence for the most recent great earthquake in 1700 has been found at many coastal locations in Washington and Oregon. It is uncertain whether a single earthquake or several separate earthquakes closely spaced in time caused the geologic effects recorded at these locations. However, there is a general consensus that the CSZ has generated earthquakes of M8 or larger in the past few thousand years (Atwater et al., 1995; Nelson and Personius, 1996; and Weaver and Shedlock, 1996), and there is increasing evidence that the CSZ has had one or more

M9 or greater earthquakes in the last several thousand years. Analysis of historical records of tsunamis in Japan support the interpretation that the most recent great earthquake on the CSZ was about M9. (Satake and Tanioka, 1996; Atwater, 2005). This type of event apparently occurs every several hundred years and results in major earthquakes at depths of approximately 6 to 25 miles beneath coastal and offshore Washington and/or Oregon. A M8+ earthquake on the CSZ offshore southwest Washington-northwest Oregon would generate long-period ground motions for a relatively long duration at the PMEC site.

Intraplate seismic events appear to be more widespread geographically and result from rupture within the subducted plate at depths of 20 to 55 miles. Based primarily on the historical seismicity of intraplate origin in western Washington and other subduction zones of the world, the intraplate zone is considered capable of generating earthquakes as large as M7.5. Because intraplate earthquakes do not cause deformation at the ground surface that can be distinguished from other types of earthquakes, the typical frequency of these earthquakes cannot be readily assessed. However, these types of earthquakes have historically caused the greatest amount of damage in the Puget Sound region. Intraplate seismic events have generated three of the largest historical seismic events to affect the Pacific Northwest: the 1949 Olympia earthquake of magnitude M7.1, the 1965 Seattle earthquake magnitude M6.5, and the 2001 Nisqually M6.8 earthquake. These earthquakes caused substantial damage in central and southern Puget Sound but no substantive damage in the Kalama area (Thorsen, 1986; University of Washington Geophysics WEB site, http://www.geophys.washington.edu/seis/.). No historical, damaging intraplate earthquakes have occurred in the northern portion of the Willamette Lowland.

There is increasing geologic evidence that other regional seismic sources in western Washington and Oregon have the potential to produce shallow continental crust earthquakes. Shallow crustal seismic events appear to be more widespread geographically relative to the other sources of historical seismicity, and often occur along mapped or postulated faults exposed at the earth's surface. Based primarily on historic and paleo-seismicity, Quaternary shallow crustal faults are considered capable of generating earthquakes greater than M6 and potentially as large as M7.0 to M7.5, such as the 1872 North Cascade event which was estimated to be a M7.3 (Noson et al., 1988). The largest instrumentally recorded shallow crustal earthquake in the Portland Basin area is the 1962 M5.2 earthquake located 15 km northeast of downtown Portland (Wong and Bott, 1995). This has not been definitively associated with a recognized late Quaternary fault.

Studies by Pezzopane (Pexxopane, 1993), Geomatrix Consultants (Geomatrix, 1995), and Wong et. al. (Wong et. al, 1999) among others show that numerous crustal faults with earthquake potential exist in southwestern Washington and Oregon (Figure 3.1-7). A decade ago, many of these faults were unknown or not recognized as being seismogenic. Although the largest known crustal earthquake in the site region is only about M6 (Wong et al., 1999), potential exists for events of M6.5 and greater along several recognized faults, including the Portland Hills fault in Portland (Wong et al., 2000).

No recognized crustal faults occur in the vicinity of the PMEC that are either active or potentially active (Figure 3.1-7). no historical surface-rupture earthquake on any fault has occurred within northwestern Oregon and southwestern Washington and paleoseismic investigations of the regional faults have been limited to date. The closest Quaternary faults to the PMEC ares the Doty fault north of the site in southwestern Washington (No. 36 in Figure 3.1-7) and the Portland Hills Fault A and Frontal Fault –Lackamas Lake faults to the southwest in the Portland Basin (Nos. 12 and 14 in Figure 3.1-7).

According to the Seismic Hazard Maps published by the USGS in 2002 (http://earthquake.usgs.gov/research/hazmaps/), the peak ground acceleration estimated for the PMEC site area is on the order of 0.18g for a 475-year return period earthquake (i.e., ground motion with a 10 percent chance of being exceeded in 50 years) and 0.35g for a 2475-year return period earthquake (i.e., ground motion with a 2 percent of being exceeded in 50 years).

3.1.3.1 Impacts

The primary impacts of the PMEC on geologic conditions and materials at the site are foundation construction, excavation, grading, trenching, backfill and compaction associated with the site development and the natural gas pipeline. These activities result in densification of loose granular soils and consolidation of soft cohesive soils. Grading activities at the site would only directly affect artificial fill soils already present. Therefore, the PMEC would have no adverse effects on the geologic conditions at the site.

3.1.3.2 Mitigation measures

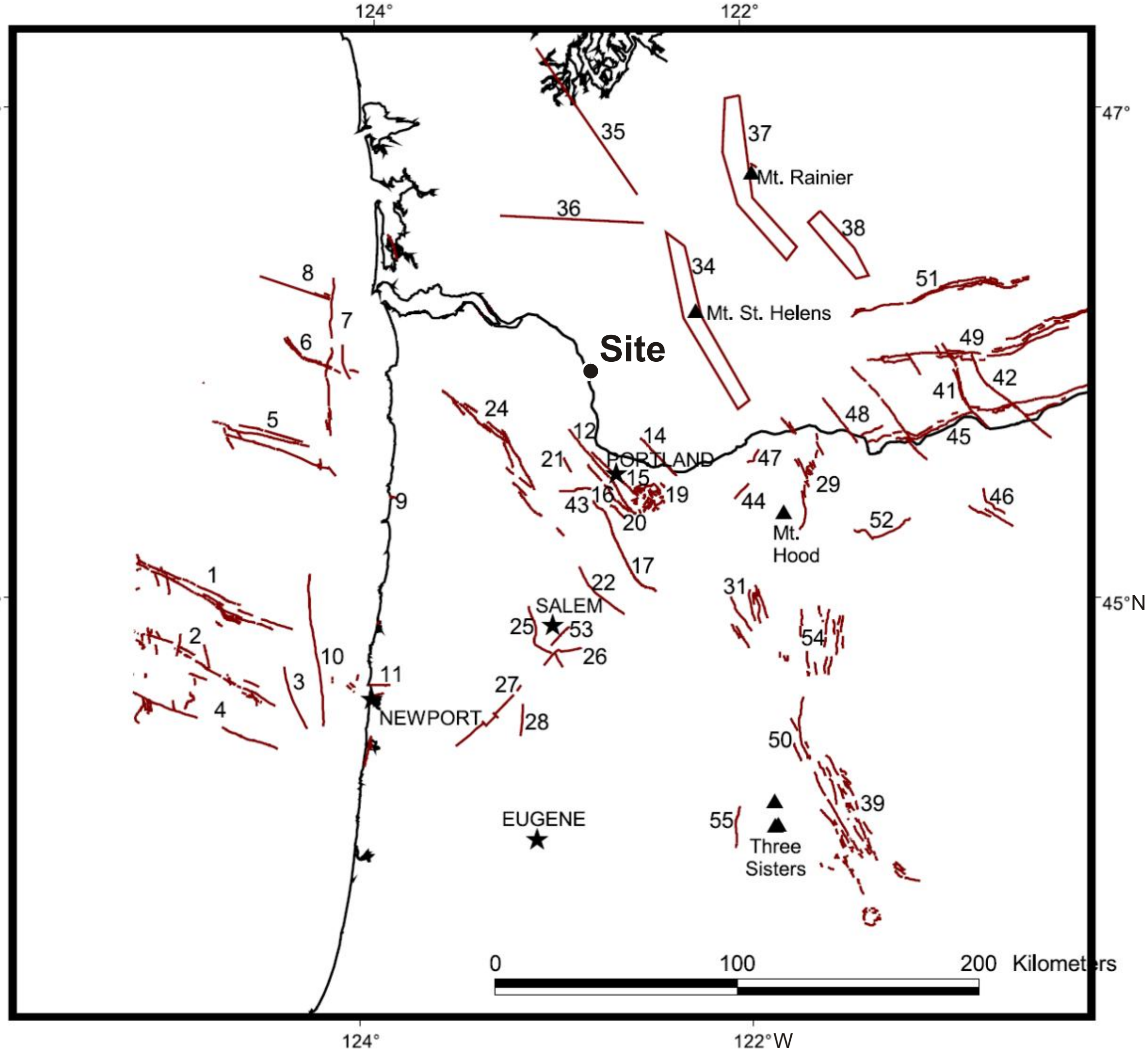
No mitigation measures are required.

3.1.4 SOILS

3.1.4.1 Existing Environment

PMEC Site

Near-surface soils in the vicinity of the site have been mapped as described in the Soil Survey of Cowlitz County, Washington (USDA, 1988) and as shown in Figure 3.1-8. The taxonomic soil units occupying the PMEC site are Caples silt and silty clay loam, Maytown silt loam, and Riverwash alluvial deposits. The Caples and Maytown units were formed in alluvium and consist of very deep, poorly drained to moderately well drained soils with 0 to 3 percent slopes. These soils are comprised of 20 to 45 percent clay, have slight potential for erosion, and have slow to moderately slow permeability ranging from 0.06 to 2 inches per hour. The Caples unit typically contains a greater percentage of clay than the Maytown and is consequently less permeable and less well-drained.



01 - Wecoma Fault
02 - Daisy Bank Fault
03 - Stonewall Bank Fault
04 - Alvin Canyon Fault
05 - Fault G
06 - Fault H
07 - Nehalem Bank Fault
08 - Fault J
09 - Netarts Bay Fault
10 - Yaquina Bay Fault
11 - Waldport Fault
12 - Portland Hills Fault A
14 - Frontal Fault - Lacamas Lake
15 - East Bank Fault
16 - Oatfield Fault
17 - Mollala Canby Fault
19 - Grant Butte Fault
20 - Bolton Fault
21 - Helvetia Fault
22 - Mt. Angel Fault
24 - Gales Creek Fault
25 - Salem Hills Fault
26 - Mill Creek Fault
27 - Corvallis Fault
28 - Owl Creek Fault
29 - Hood River Fault
31 - Clackamas River Fault
34 - St. Helens Fault Zone
35 - Olympia Fault
36 - Doty Fault
37 - Western Rainer Zone
38 - Goat Rocks Zone
39 - Sisters Fault Zone
41 - Oak Flat Fault
42 - Arlington-Shutler Butte Fault
43 - Beaverton Fault
44 - Bull Run Fault
45 - Columbia Hills
46 - Condon Northwest Fault
47 - Eagle Creek Fault
48 - Fault Near Dalles
49 - Horse Heaven Hills Fault
50 - Metolius Fault
51 - Toppenish Ridge Fault
52 - Tygh Ridge Fault
53 - Waldo Hills Fault
54 - Warm Springs-Shitike Fault
55 - White Branch Fault

Figure 3.1-7

Quaternary Faults and Seismic Source Zones in Northwest Oregon and Southwest Washington

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Riverwash deposits typically consist of stratified alluvial cobbles, gravel, sand, silt, and clay. The unit is very deep and has slopes of 0 to 2 percent. Riverwash is a primarily coarse-grained unit, containing only 2 percent clay or less, exhibiting rapid to very rapid permeability ranging from 6 to 20 inches per hour. Flooding and erosion are frequent in Riverwash deposits, and the unit may be somewhat poorly drained to somewhat excessively drained, depending on its location and particular depositional conditions.

The specific local subsurface soil conditions beneath the proposed PMEC site and the site vicinity are documented in reports produced by Hart Crowser (Hart Crowser, 1995a, 1995b), Parametrix (Parametrix, 1995), and Dames & Moore (D &M, 1974) and are described in greater detail in Section 3.1.2 above.

Natural Gas Pipeline

Near surface soils along the planned pipeline corridor have been mapped as described in the Soil Survey of Cowlitz County, Washington (USDA, 1988) and as shown on Figure 3.1-8. The taxonomic soil units occupying the pipeline corridor are predominantly Caples silt and silty clay loam, Maytown silt loam, Pilchuck loamy fine sand, and Greenwater gravelly loamy sand. In addition, some short segments of the pipeline route cross other sand, silt, and silty clay loam units that are similar in character to the four units named above. Approximately ¾ of a mile north of the planned southern terminus of the pipeline, the route traverses andesite-derived gravel- and cobble-dominated soils of the Schneider Series (USDA, 1988).

The Caples and Maytown units are described in the discussion of the PMEC site soils above. The Greenwater and Pilchuck units consist of very deep, somewhat excessively drained soils with slopes ranging from 0 to 8 percent. The Pilchuck unit was formed in alluvium and may contain up to 15 percent rock fragments and 15 percent pumice fragments within a sand-dominated matrix. The Greenwater unit was formed in alluvium mixed with pumice and aerially-deposited volcanic ash and is comprised principally of fine sand with up to 15 percent rock fragments and 25 percent volcanic ash, cinders, and pumice. The Pilchuck and Greenwater units both exhibit rapid permeability and are classified as having a slight potential for erosion (USDA, 1988).

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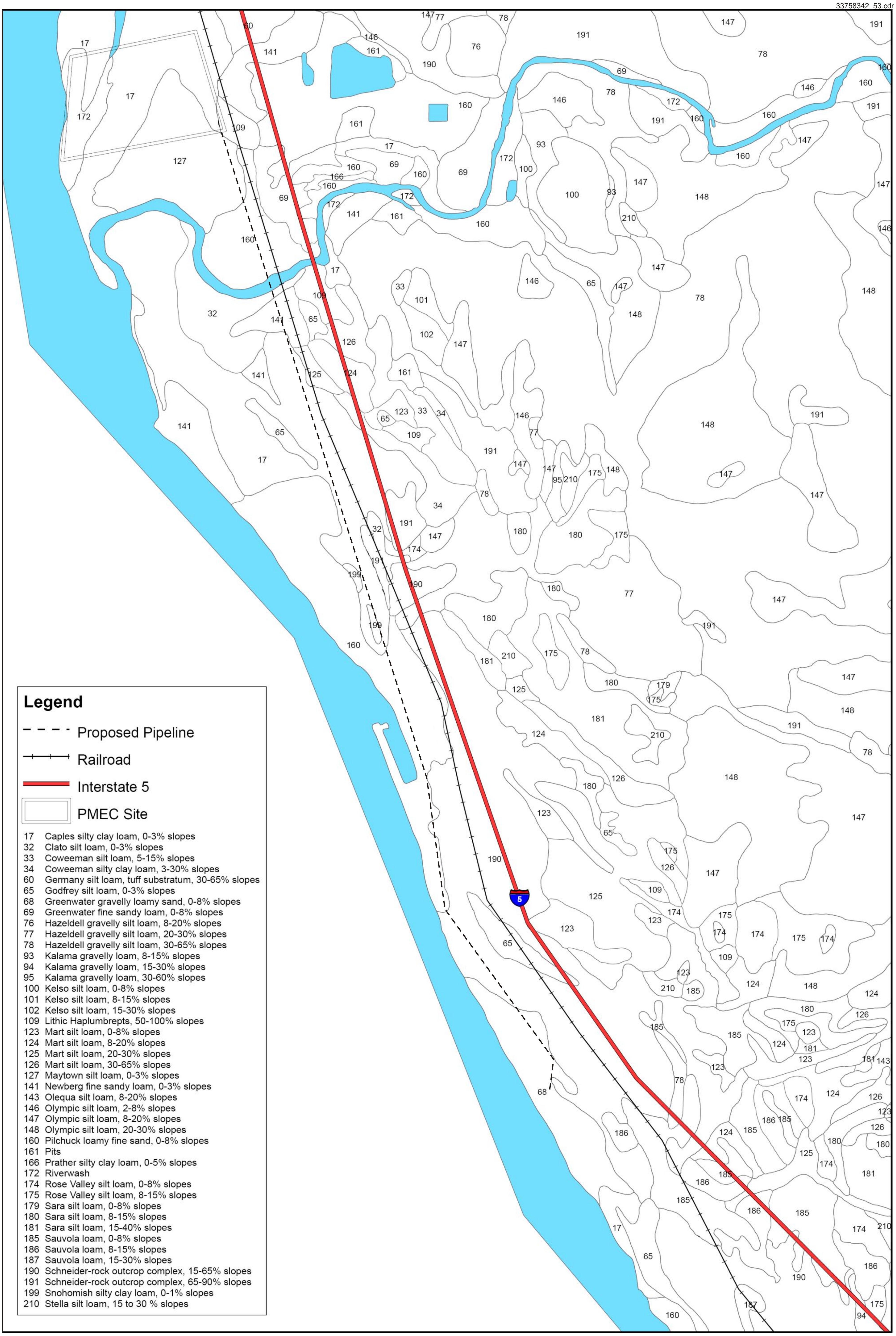

Figure 3.1-8
Soils Map

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3.1.4.2 Impacts

PMEC Site

Grading and Foundations

Foundations for the facility and the grading plan would be determined during final design. Preliminary geotechnical data (PBS, 2006) indicate soils at the site may need to be densified using typical ground improvement techniques available to the construction industry, or deep foundations such as piles may be selected so that structural loads are carried to more competent soils below soils that are susceptible to settlement or liquefaction. Limited grading and/or placement of additional fill may be performed to obtain necessary grades.

Because surface soils on the PMEC site consist of dredged soil fill, no adverse impacts on the site soil are anticipated from the grading and foundation construction activities.

Natural Gas Pipeline

Trench Excavations

The pipeline trench would be excavated to a depth of approximately six feet to allow at least 42 inches of cover over the pipeline. Excavations would result in ground disturbance, thereby changing the engineering characteristics of the soils, including density and permeability. Normally, trench materials near the optimum moisture content expand approximately ten percent when they are removed from the trench. As the trench materials are replaced, they would be compacted to a density condition equal or greater (at least 90%) than when they were removed to reduce the potential for post-construction settlement. Trench material would be evenly distributed over the right-of-way to bring the excavation area up to the surrounding grade. Excess soil anticipated from pipeline construction would principally result from the volume of material displaced by the pipe and bedding materials. In addition, excess material may be generated by replacement with low permeability soils along the edges of wetlands and removal and replacement of moisture-sensitive soils that cannot be mixed with non-sensitive soils and reused. The excess material would be disposed of elsewhere on site, transported to a location requiring clean fill, or disposed of at a landfill. During construction, erosion control and trench stabilization measures would be implemented. Therefore, the impacts of trench excavations are expected to be minor due to the implementation of these mitigation measures.

Trench Backfill Placement

The weight of the heavy construction equipment rolling over the trench is normally found to bring the compaction level to as high as 85% depending on moisture content and material type. In areas that are resistant to compaction, the moisture content would be modified and densified with appropriate vibratory compaction equipment. If groundwater accumulates in the trench, coarse granular material that is not moisture sensitive would be used as backfill. At locations where greater than 85% compaction is necessary, such as at road crossings, the trench would be compacted in six inch to one-foot lifts until the backfill is flush with the original grade.

River Crossing

The crossing of the Kalama River is proposed to be either by hanging the pipeline on the existing bridge or by horizontal directional drilling (HDD) under the river. No impacts to streams are anticipated.

3.1.4.3 Mitigation Measures

Site-specific geotechnical engineering evaluations have and would be conducted prior to design of the PMEC to identify design methods to address the potential impacts presented above. The following mitigation measures would be included during construction:

The placement of fill consisting of moisture-sensitive soils would be limited to the drier months. If the construction schedule requires backfilling during other periods, additional mitigation measures would be used. A qualified geologist or engineer would monitor the fill placement during construction and conduct appropriate field tests to verify proper compaction of the fill soils.

3.1.5 TOPOGRAPHY

3.1.5.1 Existing Environment

PMEC Site

The existing topography at the site is relatively flat and the surface elevation ranges from a high of approximately 24 feet above mean sea level (ft-MSL) to as low as 18 ft-MSL near the bank of the Columbia River (Parametrix, 1995).

Natural Gas Pipeline

The existing topography for the proposed gas pipeline route is relatively flat. The route crosses the Kalama River, and would be either hung on the existing bridge or horizontally drilled under the river.

3.1.5.2 Impacts

PMEC Site

Limited grading is expected for the site and no significant impacts to topography are expected.

Natural Gas Pipeline

The construction of the gas pipeline would generally be within Hendrickson Drive. However, there may be a need to remove existing obstacles such as trees, vegetation, and boulders as necessary from the construction right-of-way. After the installation of the pipeline, the ditch would be back-filled and regraded to approximately current topography. As a result, construction of the gas pipeline would have an insignificant effect on topography.

3.1.5.3 Mitigation measures

No mitigation measures for topography are required.

3.1.6 UNIQUE PHYSICAL FEATURES

3.1.6.1 Existing Environment

The site, including the corridor for the gas pipeline, is currently vacant and sparsely vegetated, with no sharp topographic changes or outcroppings. Therefore, unique physical features are not considered to be of significant concern for the PMEC.

3.1.6.2 Impacts

None are anticipated.

3.1.6.3 Mitigation Measures

None are required

3.1.7 EROSION/ENLARGEMENT OF LAND AREA (ACCRETION)

Erosion is the breakdown and transport of soils and bedrock by natural processes including water, wind, and glaciation. The susceptibility of any material to erosion is dependent upon 1) chemical and physical characteristics (e.g., cohesion); 2) topography; 3) the amount and intensity of precipitation and surface water; 4) the intensity of wind; and 5) the type and density of vegetative ground cover, if present.

The assessment of erosion potential is principally based on the erosion potential specified for the surficial soils by the Natural Resources Conservation Service (NRCS; formerly the Soil Conservation Service). The NRCS uses an erosion factor, K, to indicate the susceptibility of a soil to sheet and rill erosion by water. This is one of the six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. The values of K range from 0.05 to 0.69, with higher K indicating more erosion susceptible soil. K-values below 0.13 are considered to have low potential for erodibility; values in the range of 0.13 to 0.26 are considered medium; and values higher than 0.26 are considered high. The effect of wind erosion is given by grouping the soils into different wind erodibility groups.

3.1.7.1 Existing Environment

PMEC Site

The erosion factor, K, values for soil at the proposed development site range from 0.28 to 0.43 for the Caples and Maytown loams and from 0.05 to 0.10 for the Riverwash deposits (USDA, 1988). These erosion factors indicate that the Caples and Maytown loams have a high potential for erosion by water and the Riverwash unit has a low potential. However, the Caples and Maytown loams are classified by the USDA as having a slight overall potential for erosion, indicating that other variables, such as the low permeability and extremely shallow slopes of these units, have greater influence on the erodibility characteristics of soils at the site. Most soils found in the site vicinity are classified as having a low susceptibility to wind erosion, with the exception of Riverwash deposits.

Natural Gas Pipeline

The K values for the soils encountered along the planned natural gas pipeline corridor range from 0.05 to 0.20 for the Greenwater, Pilchuck, and Schneider units and from 0.15 to 0.43 for the other soil units occupying the route. Based on the spatial distribution of the soil units, these erosion factors indicate that the northern portion of the pipeline corridor generally has a greater potential for erosion by water than the southern portion. The overall potential for erosion by water is considered low, since the units with the highest K values are classified by the USDA as having slight susceptibility to erosion. Most soils along the pipeline route are classified as having low to moderate susceptibility to wind erosion, with the exception of the sand-dominated Greenwater and Pilchuck units and the Newberg fine sandy loam.

3.1.7.2 Impacts

PMEC Site

The site is located in an area that could experience some accretion by natural depositional processes in the low-probability event of flooding or a large volume lahar that reaches the mouth of the Kalama River. The potential for erosion or aggradation related to the planned development would be greatest during the construction process. The USDA classifies surficial soils at the site as generally having low erosion potential. During the dry season, soils that are disturbed and stripped of vegetative cover may be susceptible to wind erosion. The potential for erosion by wind and water would be minimized through the use of erosion control measures to be outlined in the Stormwater Pollution Prevention Plan (SWPPP) as described in Section 2.10.

Natural Gas Pipeline

In general, the proposed pipeline corridor is not located in areas expected to experience significant accretion by natural depositional processes. The potential exception is where the pipeline route crosses the Kalama River. It is possible that natural processes could cause aggradation of sediments at this location.

Excess soils would likely be generated as a result of the gas pipeline installation. The minimum volume of the excess soils would be slightly more than the volume of displacement by the pipe; this is the result of the change in soil density resulting from the ground disturbance. Additional excess soils may be generated due to removal of unsuitable soils for backfill during trench excavation, and placement of base coarse or structural fill. The exposed disturbed soil would be susceptible to water-caused erosion prior to appropriate disposal offsite, however erosion potential would be minimized through the use of erosion and sedimentation control measures to be outlined in the Stormwater Pollution Prevention Plan (SWPPP) to be developed as described in Section 2.10. The Kalama River would be crossed by either hanging the pipeline on the existing bridge or HDD beneath the channel and thus its drainage channel and flow conditions would not be modified.

3.1.7.3 Mitigation Measures

See Sections 2.10 Surface Water Runoff and 2.14 Construction Methodology for a description of construction techniques to be used in sensitive areas. As presented in these sections, Best Management Practices (BMPs) and other measures would be taken to mitigate potential erosion hazards presented to the PMEC and the natural gas pipeline.

PMEC Site

Erosion control measures for construction at the site are outlined in Sections 2.10.1.1 and 2.14.1 The sequences and methods of construction activities would be controlled to limit erosion and are summarized below:

Site-specific BMPs for temporary erosion and sedimentation control during construction would be identified on the construction plans and construction permit applications submitted to EFSEC. BMPs would be selected from the Department of Ecology's Stormwater Management Manual for Western Washington (SWMMWW), as appropriate for the site slopes, the construction activities, weather conditions, and potentially sensitive areas. A Construction SWPPP would be developed and would describe the surface water management system, planned BMPs, procedures for inspection, communicating deficiencies, taking corrective action, training, and record keeping.

Clearing, excavation, and grading would be limited to the minimum areas necessary for construction of the PMEC, and would not be done far in advance of facility construction. Slopes would be graded to no steeper than 3 feet horizontal (H) to 1 foot vertical (V), where practical. Steeper slopes may require additional slope and soil stabilization during and following construction.

Ground surface restoration would be completed within fourteen days of the area's final disturbance. Interim surface protection measures, such as erosion control matting or plastic sheeting, may also be required prior to final disturbance and restoration if warranted by the potential for erosion.

Sediment control measures used during construction would be based on a 10-year design storm. Water quality measures (other than sediment removal) would be based on the 6-month, 24-hour duration storm.

Erosion control measures, as discussed in Section 2.10.1.1 would be constructed and maintained as required to control runoff and erosion from construction activities

Natural Gas Pipeline

Erosion control measures for construction of the natural gas pipeline are outlined in Sections 2.10.1.2 and 2.14.2 and include:

Site-specific BMPs would be designed and implemented for construction activities. These practices include limiting certain construction activities and installing control structures such as sediment traps, diversion ditches, and silt fences. The SWPPP would include limits on the area to be disturbed, the retention of vegetation where feasible, drainage retention during construction, soil replacement, and replanting after construction.

The backfill soils would be properly compacted to reduce the potential for post-installation erosion and settlement.

Excess soils may be generated as a result of the installation of pipeline and may require stockpiling prior to disposal or reuse. These would be protected from wind and water erosion prior to appropriate disposal or reuse.

After the contours have been re-established, the topsoil or roadbed subsurface materials that had been previously segregated would be redistributed across the surface of the right-of-way. As appropriate, the roadway would be repaved to Cowlitz County standards. For areas outside of the paved roadway area, native grasses or other native vegetation would be planted and fertilized in accordance with Port of Kalama and agency requirements. Temporary fencing that was installed at the beginning of construction would be removed and any original fences re-established where appropriate.

3.2

WAC 463-60-312 Natural Environment—Air.

The application shall provide detailed descriptions of the affected environment, project impacts, and mitigation measures for the following:

(1) Air quality. The application shall identify all pertinent air pollution control standards. The application shall contain adequate data showing air quality and meteorological conditions at the site. Meteorological data shall include, at least, adequate information about wind direction patterns, air stability, wind velocity patterns, precipitation, humidity, and temperature. The applicant shall describe the means to be utilized to assure compliance with applicable local, state, and federal air quality and emission standards.

(2) Odor. The application shall describe for the area affected all odors caused by construction or operation of the facility, and shall describe how these are to be minimized or eliminated.

(3) Climate. The application shall describe the extent to which facility operations may cause visible plumes, fogging, misting, icing, or impairment of visibility, and changes in ambient levels caused by all emitted pollutants.

(4) Dust. The application shall describe for any area affected all dust sources created by construction or operation of the facility, and shall describe how these are to be minimized or eliminated.

[Statutory Authority: RCW 80.50.040 (1) and (12). 04-21-013, amended and recodified as § 463-60-312, filed 10/11/04, effective 11/11/04. Statutory Authority: RCW 80.50.040. 92-23-012, § 463-42-312, filed 11/6/92, effective 12/7/92.]

SECTION 3.2
(WAC 463-60-312)

3.2.1 AIR QUALITY

Air quality in Washington is typically regulated by several agencies. In Kalama, the Southwest Region Clean Air Agency (SWCAA) is typically the local authority for air quality permitting of industrial sources, and permits minor sources through the Notice of Construction (NOC) permit process. The Department of Ecology (Ecology) generally retains the authority for air quality permitting of major sources in attainment areas through the Prevention of Significant Deterioration (PSD) permit process. The United States Environmental Protection Agency (USEPA) also has a role in the PSD process and in ensuring all states have plans in place to maintain compliance with ambient air quality standards.

Because Energy Facility Sitting Evaluation Council (EFSEC) has jurisdiction over power plants capable of generating 350 megawatt (MW) or more, EFSEC is the responsible permitting authority over the Pacific Mountain Energy Center (PMEC) and has been delegated this authority from USEPA. EFSEC has adopted virtually all of the air quality regulations established by Ecology that apply to facilities such as PMEC. Consequently, this section may refer to regulations established by Ecology, SWCAA, or USEPA even though EFSEC is the permitting authority for PMEC. For the PMEC, EFSEC would issue the permit, after technical review by Ecology staff specifically assigned to EFSEC. USEPA would co-sign the permit. After issuance of the air operating permit, SWCAA would likely to administer the permit issued by EFSEC to PMEC through a delegation agreement with EFSEC**.**

The distinction between emissions and concentrations is important in the review of air quality issues. Emission regulations limit the amount of a particular air pollutant that can be emitted from a stack or facility (e.g., 10 pounds per hour [lbs/hr] of particulate matter). Ambient air quality standards limit concentrations of certain air pollutants (in parts per million [ppm] or millionths of a gram per cubic meter of air [$\mu g/m^3$]) in the outdoor air.

The Air Quality Impact Analysis (AQIA) developed as part of the PSD permit application in Section 5.1 of this Application determined that worst-case emissions from the PMEC would result in ambient concentrations far below Washington and National Ambient Air Quality Standards (WAAQ and NAAQS), less than Oregon Ambient Air Quality Standards (OAAQS), and well within allowable PSD increments for Class I and Class II areas. Calculated concentrations of toxic air pollutants (TAPs) attributable to the PMEC also meet Washington ambient criteria.

3.2.1.1 Emission Limits

USEPA has established performance standards for a number of air pollution sources in 40 CFR Part 60. These New Source Performance Standards (NSPS) represent a minimum level of control that is required for a new source. NSPSs that apply to PMEC emission units include:

- Subpart Da, Standards of Performance for Electric Utility Steam Generating Units for Which Construction is Commenced After September 18, 1978,
- Subpart HHHH, Mercury (Hg) Budget Trading Program General Provisions,
- Subpart Db, Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units,
- Subpart Dc, Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units,
- Subpart Y, Standards of Performance for Coal Preparation, and
- Subpart A, General Provisions.

Emission limits imposed by these NSPS are discussed in more detail in Section 5.1.2.1. In general, NSPS limits are much less stringent than the emission limits that result from the Best Available Control Technology (BACT) analysis process, and are, therefore, not particularly restrictive when BACT is required.

As discussed in Appendix B-1, BACT is determined by evaluating which control scenario best protects ambient air quality, considering the economic, energy and environmental and other costs of each alternative. Chapter 173-460 also requires that a BACT analysis be conducted for TAPs. Generally, the same technologies or operations that reduce criteria pollutants also reduce TAPs. For example, the use of combustion controls to optimize combustion also reduces both criteria and TAPs.

General standards for maximum emissions from air pollution sources are outlined in WAC 173-400-040. This section limits visible emissions to 20% opacity except for 3 minutes per hour; controls nuisance particulate fallout, fugitive dust, and odors; and limits SO_2 emissions to no more than 1000 ppm (hourly average, 7% O_2, dry basis). WAC 173-400-050 identifies emission standards for combustion and incinerator units, and limits particulate matter emissions to 0.1 grains per dry standard cubic foot at 7% O_2.

SWCAA regulations mirror Ecology's emission limits from new sources. The SWCAA regulation's opacity standard limits the plume to 20% opacity except for 3 minutes of any hour. Particulate matter emissions are limited to 0.1 grains per dry standard cubic foot. Sulfur emissions, calculated as sulfur dioxide, are limited to 1000 ppm.

The maximum PM_{10} emission rate for each combustion turbine would be 24 lb/hr. Given a flow rate of approximately 1 million actual cubic feet per minute (acfm) from each turbine, this emission rate corresponds to a grain loading of less than 0.01 grains/actual cubic foot (gr/acf) and less than 0.01 grains per dry standard cubic foot (gr/dscf). Thus, the anticipated grain loading is about 10 percent of the 0.1 gr/dscf allowed by the state regulation. Plume opacity associated with grain loadings this low would be less than 5 percent, which is well below the allowed 20 percent. The anticipated SO_2 concentrations would be well below the state limit of 1000 ppm.

3.2.1.2 Ambient Air Quality Standards

Ambient air quality standards have been established by USEPA, Ecology, and the Oregon Department of Environmental Quality (ODEQ) (Table 3.2-1). Some of the pollutants in Table 3.2-1 are subject to both "primary" and "secondary" NAAQS. Primary standards are designed to protect human health with a margin of safety. Secondary standards are established to protect the public welfare from any known or anticipated adverse effects associated with these pollutants, such as soiling, corrosion, or damage to vegetation.

TABLE 3.2-1
AMBIENT AIR QUALITY STANDARDS AND PSD INCREMENTS

Pollutant	National Ambient Air Quality Standards: National Primary	National Ambient Air Quality Standards: National Secondary	Washington	Oregon[h]	Class I PSD Increments	Class II PSD Increments
Total Suspended Particulate						
Annual Geo. Mean ($\mu g/m^3$)			60			
24-hour Average ($\mu g/m^3$) [b]			150			
Inhalable Particulate (PM_{10})						
Annual Arith. Mean ($\mu g/m^3$)	50	50	50	50	4	17
24-hour Average ($\mu g/m^3$) [g]	150 [b]	150 [b]	150 [b]	150 [b]	8	30
Fine Particulate ($PM_{2.5}$)						
Annual Arith. Mean ($\mu g/m^3$) [e]	15	15	15			
24-hour Average ($\mu g/m^3$) [f]	65	65	65			
Sulfur Dioxide (SO_2)						
Annual Average (ppm)	0.03		0.02	0.02	2 $\mu g/m^3$	20 $\mu g/m^3$
24-hour Average (ppm) [b]	0.14	0.50	0.10	0.10	5 $\mu g/m^3$	91 $\mu g/m^3$
3-hour Average (ppm) [b]			0.40[a]	0.50	25 $\mu g/m^3$	512 $\mu g/m^3$
1-hour Average (ppm) [b]						
Carbon Monoxide (CO)						
8-hour Average (ppm)[b]	9		9	9		
1-hour Average (ppm) [b]	35		35	35		
Ozone (O_3)						
1-hour Average (ppm) [c]	0.12	0.12	0.12	0.12		
8-hour Average (ppm) [d]	0.08	0.08				
Nitrogen Dioxide (NO_2)						
Annual Average (ppm)	0.05	0.05	0.05	0.05	2.5 $\mu g/m^3$	25 $\mu g/m^3$
Lead (Pb)						
Quarterly Average ($\mu g/m^3$)	1.5	1.5	1.5	1.5		

$\mu g/m^3$ = micrograms per cubic meter; **ppm** = parts per million
[a] Also, 0.25 ppm not to be exceeded more than twice in seven days
[b] Not to be exceeded on more than once per year.
[c] Not to be exceeded on more than 1 day per calendar year as provided in Chapter 173-475 WAC.
[d] Based on the 3-year average of the annual fourth-highest daily maximum 8-hour average ozone concentration at each monitor.
[e] Based on the 3-year average of annual arithmetic mean $PM_{2.5}$ concentrations.
[f] Based on the 3-year average of the 98th percentile of 24-hour $PM_{2.5}$ concentrations at each monitor within an area.
[g] Based on the 99th percentile of 24-hr PM10 concentrations at each monitor.
[h] OAAQS are provided for informational purposes.

Annual standards never to be exceeded; short term standards not to be exceeded more than once per year unless otherwise noted.

Sources include: NAAQS (40 CFR 50), WAAQS (Chapters 173-470, 474, and 475 WAC), OAAQS (OAR 340-202), and PSD Increments (40 CFR 51.166).

3.2.1.3 Toxic Air Pollutant Regulations

Washington regulates emissions of TAPs from new and modified air pollution sources (Chapter 173-460 WAC). This regulation establishes acceptable outdoor exposure levels (called Acceptable Source Impact Levels, or ASILs) for each of more than 500 substances. The ASILs were set conservatively to protect human health. For each "known, probable and potential" human carcinogenic pollutant (the Class A toxic air pollutants), the ASIL limits the risk of an additional cancer case to one in a million. For others (Class B toxic air pollutants), the ASIL has been set by dividing worker exposure limits by 300; this was done to protect public health in a community with multiple sources of a toxic air pollutant. Most of Class A toxic air pollutants ASILs are based on an annual average concentration. A few of the Class A pollutants and all of the Class B pollutants are based on a 24-hour average concentration. The regulations also identify Small Quantity Emission Rates (SQERs). If the total emissions of a given pollutant are greater than its SQER, dispersion modeling is required to determine compliance with ambient air quality criteria (Acceptable Source Impact Levels, or ASILs).

In addition, Chapter 173-460 WAC requires the use of Best Available Control Technology for toxic air pollutants (commonly referred to as T-BACT). If the SQER is exceeded after applying T-BACT, dispersion modeling is used to evaluate potential ambient air impacts from potential TAPs emissions that would occur with T-BACT and compare these modeled ambient concentrations with the ASILs. If calculated concentrations are less than the ASILs, a permit can be granted. If ASILs are exceeded, the applicant must revise the project or submit a health risk assessment demonstrating that toxic emissions from the source are sufficiently low to protect human health. For carcinogenic pollutants, the risk of an additional cancer case cannot exceed one in 100,000. The TAPs which exceeded the SQER and ASIL comparison is presented in Section 5.1 of this Application.

3.2.1.4 Notice of Construction and Application for Approval

State law requires a Notice of Construction (NOC) for new air contaminant sources in Washington. The Notice of Construction application provides a description of the facility and an inventory of pollutant emissions and controls. The reviewing agency considers whether BACT has been employed and evaluates ambient concentrations resulting from these emissions to ensure compliance with ambient air quality standards. Chapter 5.1 of this Application serves as a single application for the NOC approval and a PSD permit. When both an NOC approval and PSD permit are required, the NOC approval addresses those pollutants criteria pollutants emitted in less than PSD significant emissions rates and other non-criteria pollutants (i.e., TAPs) that are not subject to PSD review.

3.2.1.5 Prevention of Significant Deterioration (PSD)

The PSD regulations were established by USEPA to ensure that new or expanded sources do not cause the air quality in areas that currently meet ambient standards (i.e., attainment areas) to deteriorate significantly. These regulations set PSD Increments that limit the increases in sulfur dioxide (SO_2), nitrogen dioxide (NO_2) and particulate matter (PM) concentrations that may be produced by a new source. Increments have been established for three land classifications. The most stringent increments apply to Class I areas, which include wilderness areas and national parks. The Class I area nearest the project site is the Mt. Adams Wilderness area located about 95 kilometers east of Kalama. The vicinity of the site is designated a Class II are where less stringent PSD increments apply. Class I and Class II increments are displayed with the ambient standards in Table 3.2-1.

The PMEC s subject to PSD regulations because its emissions exceed 100 tons per year (tpy) of regulated criteria pollutants (See Table 2.11-3, Section 2.11 of this Application). Once subject to the PSD process, emissions of other pollutants that exceed specific significant emission rates are also evaluated. Anticipated annual emissions of nitrogen oxides (NOx), carbon monoxide (CO), sulfur dioxide (SO2), sulfuric acid mist, volatile organic compounds (VOCs), particulate matter (PM) and particulate matter with an aerodynamic diameter less than or equal to ten microns (PM_{10}) from the PMEC exceed the significant emission rates that trigger evaluation in the PSD permit. Chapter 5.1 of this document provides the PSD permit application and addresses significant air pollutants associated with the proposed PMEC.

3.2.1.6 Existing Conditions

The USEPA maintains a database that contains air quality data from monitoring sites across the United States. The USEPA AirData website (http://www.epa.gov/air/data/info.html) allows users to collect yearly summarized air quality data for specific monitoring sites. Air quality measurement data were collected for 2004 and 2005 for monitoring sites located in Washington and Oregon. The air quality data search was narrowed to five monitoring sites: two sites in Vancouver, one site in Longview; one site in Seattle, and one site located in Portland. In general, these stations are located where there may be air quality problems, and so are usually in or near urban areas or close to specific large air pollution sources.

Ecology and USEPA designate regions as being "attainment" or "nonattainment" areas for particular air pollutants based on monitoring information collected over a period of years. Attainment status is therefore a measure of whether air quality in an area complies with the health-based ambient air quality standards displayed in Table 3.2-1. Cowlitz County is in attainment for all air pollutants.

The 2004 and 2005 monitoring data from the five sites can be used to characterize existing air quality at the site. A summary of these data is presented in Table 3.2-2. All observed pollutant concentrations at these monitoring sites are lower than the NAAQS and WAAQS. As presented in Table 3.2-1, the OAAQS are virtually the same as WAAQS, with the only exceptions being those that are equivalent to the NAAQS. OAAQS have been compared for informational purposes. Therefore, compliance with the WAAQS and NAAQS indicates compliance with the OAAQS.

- NO_2 was monitored in Portland, where the maximum annual concentration was less than 22% of the NAAQS.
- CO was monitored in Vancouver, where the maximum concentrations were less than 55% of the NAAQS.
- The data in Table 3.2-2 indicate industrial sources do not contribute significant amounts of SO_2 in the area. SO_2 was monitored in Portland and Seattle and the maximum concentrations were less than 20% of the NAAQS.
- The maximum hourly ozone concentrations monitored in Portland were about 72% of the 1-hour NAAQS.

- PM_{10} concentrations (usually associated with wood smoke, fugitive dust, and combustion sources) were monitored in Longview, WA where maximum concentrations were less than 51% of the NAAQS.
- $PM_{2.5}$ was monitored in Vancouver, where maximum concentrations were about 69% of the annual and 67% of the 24-hour $PM_{2.5}$ standards.[1]

TABLE 3.2-2
SUMMARY OF AIR QUALITY DATA (2004 AND 2005)

Pollutant	Averaging Period (hours)	Data Source	Maximum Concentration		2004 - 2005 Average of Maximum concentrations	Lower of the NAAQS or WAAQS
			2004	2005		
PM10 (µg/m3)	24	A	39	77	58	150
	Annual	A	17	23	20	50
PM2.5 (µg/m3)	24	B	45	34	39.5	65
	Annual	B	10.1	8.7	9.4	15
SO2 (ppm)	1	C	0.044	0.06	0.052	0.40
	3	C	0.028	0.045	0.037	0.50
	24	C	0.014	0.019	0.017	0.10
	Annual	C	0.004	0.003	0.0035	0.02
SO2 (ppm)	1	D	--	0.015	0.015	0.40
	3	D	--	0.012	0.012	0.50
	24	D	--	0.006	0.006	0.10
	Annual	D	--	0.002	0.002	0.02
Ozone (ppm)	1	D	0.087	0.072	0.080	0.12
	8	D	0.072	0.062	0.067	0.08 [f]
NO2 (ppm)	Annual	D	0.010	0.011	0.011	0.05
CO (ppm)	1	E	6.4	7.2	6.8	35
	8	E	5.0	4.9	5.0	9

Ref: USEPA's AIRs database (http://www.epa.gov/air/data/info.html) Accessed February 2006.
(a) Longview, WA (254 Oregon Wy)
(b) Vancouver, WA (8205 E 4th Plain Blvd)
(c) Seattle, WA (Beacon Hill, WA)
(d) Portland, OR (5824 SE Lafayette)
(e) Vancouver, WA (2101 E 4th Plain Blvd)

3.2.1.7 Meteorology

The evaluation of air quality issues associated with the PMEC requires meteorological data to characterize dispersion conditions near the site. The dispersion modeling techniques used to simulate transport and diffusion require hourly meteorological data, including wind speed, wind direction, temperature, atmospheric stability class, and mixing height. Characteristic

[1] This comparison ignores temporal and annual averaging that is a consideration with the $PM_{2.5}$ standards. Consequently, existing concentrations are probably a lower percentage of the ambient standards.

temperature and relative humidity data are also used in the design of the facility and influence turbine power output.

After discussions with Ecology, a 1995 calendar year meteorological data set based on surface observations from Noveon Chemical was used in the dispersion modeling analysis. The station is located within the same portion of the Columbia River Valley as PMEC and collected data specifically for PSD permit applications. Winds at PMEC are bimodal, following the general north-south orientation of this portion of the Columbia River Valley. The average wind velocity for 1995 is 2.7 meter per second (m/s) and periods of calm wind are rare, occurring for less than one percent of the observations (See Figure 3.2-1).

Table 3.2-3 displays minimum, maximum and average daily temperatures from the long-term climatological records at Portland, Oregon. Portland and the site experience a temperate climate characterized by mild winters and warm summers. Summer temperatures typically reach the mid seventies, while winter temperatures are generally above freezing.

Based on Portland and Kalama historical meteorological records, Table 3.2-4 displays the average relative humidity in the morning and afternoon, average monthly precipitation, and the average number of days with heavy fog per month. The site has an annual average total of 68 inches of precipitation. Most of the precipitation falls as rain during the winter months. The Kalama climatological records contained only historical precipitation data, so the Portland climatological records are cited to describe temperature, relative humidity, and fogging days.

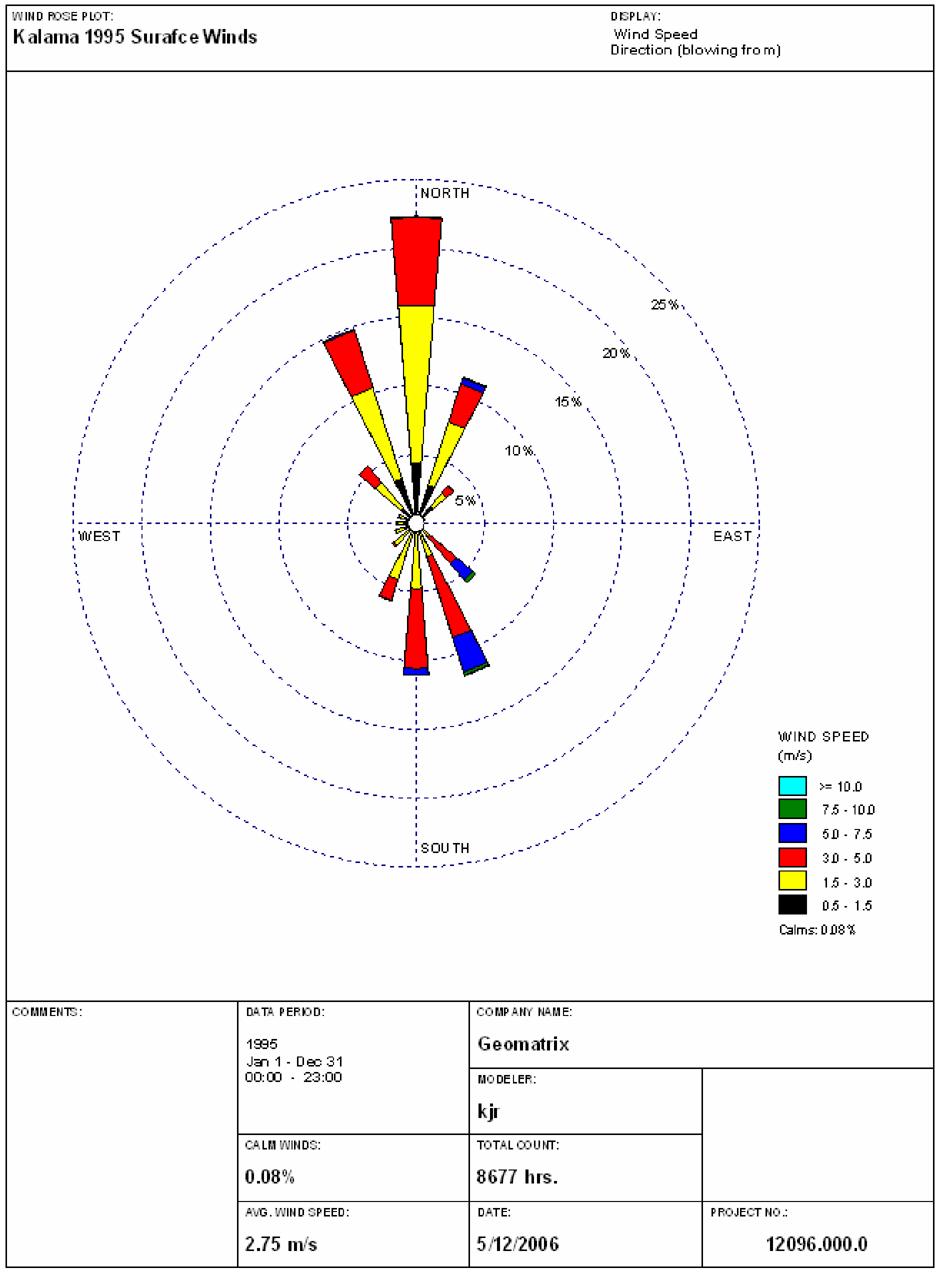

Figure 3.2-1

Wind Rose of Kalama 1995 Surface Winds

Pacific Mountain Energy Center

Kalama, Washington

TABLE 3.2-3
PORTLAND TEMPERATURES (ºF)

Month	Daily Maximum	Daily Minimum	Daily Mean	Extreme Maximum	Extreme Minimum
Jan	45	34	40	63	-2
Feb	51	36	44	71	-3
Mar	56	39	47	80	19
Apr	61	41	51	87	29
May	67	47	57	100	29
Jun	74	53	64	100	39
Jul	80	57	68	107	43
Aug	80	57	69	107	44
Sep	75	52	63	105	34
Oct	64	45	55	92	26
Nov	53	40	46	73	13
Dec	46	35	40	65	6
Year	63	45	54	107	-3

Normals based on 1961-1990 data from Western Regional Climate Center Internet Site *www.wrcc.dri.edu/cgi-bin/clilcd.pl?or24229*. Accessed July 2006.

TABLE 3.2-4
HISTORICAL RELATIVE HUMIDITY, PRECIPITATION, AND FOGGING

Month	Relative Humidity (%) [1]		Mean Precipitation (in.) [2]	Fogging (days) [1]
	10:00 LST	16:00 LST		
Jan	82	75	9.12	4
Feb	80	67	8.00	4
Mar	73	60	7.46	2
Apr	69	55	5.63	1
May	66	53	3.95	<1
Jun	65	49	2.67	<1
Jul	62	45	1.15	<1
Aug	64	45	1.52	<1
Sep	67	48	2.97	3
Oct	78	62	5.31	7
Nov	82	74	10.32	6
Dec	83	78	10.38	5
Year	73	59	68.48	33

[1] Normals based on 1961-1990 Portland, Oregon data from Western Regional Climate Center Internet Site *www.wrcc.dri.edu/cgi-bin/clilcd.pl?or24229*. Accessed July 2006.
LST = Local Standard Time
[2] Precipitation values based on 1971 – 2000 Kalama Falls Hatchery, Washington data from Western Regional Climate Center Internet Site www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?wa4084. Accessed August 2006.

3.2.1.8 Air Quality Impacts Analysis

An AQIA was conducted for the project based on the emission rates described in Section 2.11, 5.1 of this Application using a year of meteorological data from Kalama from 1995. Computer-based dispersion modeling techniques were applied to simulate the dispersion of criteria pollutant and TAP emissions from the facility to assess compliance with NAAQS, WAAQS and OAAQS, Ecology's ASILs for TAPs which excced the SQER as described in Section 2.11, and Class I and Class II PSD increments. The dispersion modeling techniques that were employed in the analysis follow USEPA regulatory guidelines (40 CFR Part 51, Appendix W). Please refer to Section 5.1.3 and 5.1.4 for additional detail regarding the modeling approach and results.

Concentrations attributable to PMEC's proposed criteria emissions are compared to Class II PSD increments and the Significant Impact Levels (SILs) in Table 3.2-5. Concentrations attributable to PMEC's proposed emissions are compared to Class I PSD Increments, USEPA proposed SILs, and Federal Land Managers (FLMs) recommended SILs in Table 3.2-6.[2] Calculated concentrations of all criteria pollutants are less than both Class I and Class II SILs and increments for all averaging periods.

TABLE 3.2- 5
COMPARISON OF MODEL PREDICTIONS WITH CLASS II INCREMENTS AND SILS

Criteria Pollutant	Averaging Time	Maximum Modeled Concentration ($\mu g/m^3$)	Class II PSD Increment ($\mu g/m^3$)	Class II PSD SIL ($\mu g/m^3$)
NO_2 [(a)]	Annual	0.84	25	1
SO_2	1-hour	38	NA	NA
	3-hour	20	512	25
	24-hour	3.0	91	5
	Annual	0.22	20	1
CO	1-hour	254	NA	2,000
	8-hour	60	NA	500
PM_{10}	24-hour	4.96	30	5
	Annual	0.4	17	1

(a) The NO_2 annual concentration calculated using the USEPA Ambient Ratio Method (ARM).

[2] Note that the use of the term "significant" impact level in the PSD program does not imply a "significant adverse impact" in a SEPA or NEPA sense, nor does it imply exceedances of ambient standards established to protect health and welfare. In fact, SILs are only a small fraction of the standards (e.g., 1% for NO_2). Where predicted pollutant concentrations exceed SILs, other significant sources of that pollutant should be considered in a cumulative analysis.

TABLE 3.2-6
COMPARISON OF MODEL PREDICTIONS WITH CLASS I INCREMENTS AND SILS

Pollutant	Averaging Period	Maximum Modeled Concentration (μg/m³) Normal Operations	Class I Area PSD Increment [(c)] (μg/m³)	USEPA Proposed SIL [(a)] (μg/m³)	FLM Recommended SIL [(a)] (μg/m³)
NO_2 [(b)]	Annual	0.0025	2.5	0.1	0.03
SO_2	3-hour	0.098	25	1	0.48
	24-hour	0.025	5	0.2	0.07
	Annual	0.002	2	0.1	0.03
PM_{10}	24-hour	0.069	8	0.3	0.27
	Annual	0.006	4	0.2	0.08

(a) USEPA proposed and FLM recommended Significant Impact Levels from the Federal Register, Vol. 61, No. 142, page 38292, July 23, 1996.
(b) NOx emitted is assumed to be fully converted to NO_2.
(c) Prevention of Significant Deterioration; from 40 CFR 52.21(c), adopted by reference in WAC 173-400-720(4)(a)(v)

Calculated concentrations attributable to the PMEC may also be compared with NAAQS and WAAQS established by USEPA and Ecology, respectively. Compliance with the ambient air quality standards may be conservatively assessed by summing the highest modeled concentrations attributable to facility and maximum measured (existing) concentrations to represent other sources of emissions. The influence of background sources is based on the air quality monitoring data discussed in Section 3.2.1.6 and as summarized in Table 3.2-2.

Total predicted concentrations are compared to the lower of the WAAQS and NAAQS in Table 3.2-7. The analysis indicates that when the maximum predicted concentrations are added to the highest monitored values, total concentrations are much less than the WAAQS or NAAQS. As discussed in 3.2.1.6, compliance with the WAAQS and NAAQS also indicates compliance with OAAQS.

TABLE 3.2-7
COMPARISON OF CUMULATIVE CONCENTRATIONS WITH AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Period	Maximum Modeled Concentration	Measured Background Concentration	Maximum Total Concentration	NAAQS	WAAQS
		($\mu g/m^3$)				
PM10	Annual	0.36	20.0	20.4	50	50
	24-hour	4.96	58.0	63.0	150	150
SO2	Annual	0.22	9.1	9.3	80	53
	24-hour	3.02	44.2	47.2	365	263
	3-hour	19.54	96.2	115.7	-	655
	1-hour	37.61	135.2	172.8	1,300	-
NO2	Annual	0.84	20.8	21.6	100	100
CO	8-hour	59.99	5,714.3	5,774.3	10,000	10,000
	1-hour	253.78	7,771.4	8,025.2	40,000	40,000

Chapter 173-460 WAC requires NOC approval applications to include dispersion modeling of TAP emissions if anticipated emissions exceed SQERs. Model predictions are compared with TAP-specific ASILs. If calculated concentrations are less than the ASILs, a permit can be granted without further analysis. Otherwise, the applicant must revise the project or submit a health risk assessment demonstrating that toxic emissions from the project are sufficiently low to protect human health. For carcinogenic pollutants, the risk of an additional cancer case can not exceed one in 100,000. Concentrations below the ASILs indicate insignificant potential for adverse health effects from these chemicals.

The dispersion modeling analysis of TAPs emitted at rates exceeding the SQERs was conducted in the same manner as for the criteria pollutants. Depending on the chemical, either the maximum predicted 24-hour or annual concentrations were compared with the ASILs. TAP emissions estimates for the PMEC is discussed in Section 5.1.2.4 of the Application and comparison to SQERs is presented in Table 5.1-13.

Maximum 24-hour and annual TAP concentrations attributable to the PMEC are compared with Ecology ASILs in Table 3.2-8 and Table 3.2-9, respectively. Predicted maximum 24-hour and annual concentrations are less than the Ecology ASILs for all TAPs which are emitted in concentrations that exceed the SQER.

Table 3.2-8
Maximum Predicted Short-Term (24-hr) TAP CONcentrations

CAS #	Compound	Maximum Predicted Concentration (ug/m3)	Washington State Class B ASIL (ug/m3)
7664-41-7	Ammonia	4	100
7647-01-0	Hydrochloric acid	0.035	7
7664-39-3	Hydrogen fluoride (Hydrofluoric acid)	0.027	8.7
6/4/7783	Hydrogen sulfide	0.89	0.9
74-83-9	Methyl bromide (Bromomethane)	0.025	5
7664-93-9 14808-79-8	Sulfuric acid and sulfates	0.5	3.3
7439-92-1	Lead	0.0003	0.5*

Notes:
* Lead is a Class A Compound although must be modeled with a 24-hour averaging time.

Table 3.2-9
Maximum Predicted Annual TAP Concentrations

CAS #	Compound	Maximum Predicted Concentration (ug/m3)	Washington State Class A ASIL (ug/m3)
75-07-0	Acetaldehyde	0.00006	0.45
7440-38-2	Arsenic	0.00013	0.00023
71-43-2	Benzene	0.075	0.12
7440-41-7	Beryllium	0.00001	0.00042
7440-43-9	Cadmium	0.00020	0.00056
18540-29-9	Chromium, (hexavalent)	0.00004	0.000083
50-00-0	Formaldehyde	0.005	0.077
75-09-2	Methylene chloride (Dichloromethane)	0.00006	0.56
7440-02-0	Nickel	0.00037	0.0021
	Polyaromatic Hydrocarbon (PAH)	0.00000	0.00048

3.2.2 ODOR

Construction of the PMEC would include some activities that would generate odors. If oil based paints are applied to structures or equipment at the site, paint odors may be perceptible nearby. Some of the site would be paved with asphalt, and asphalt fumes may be perceptible for a short period during the paving operation. These impacts are anticipated to be slight and of short duration.

Operation of the facility would not generate odors that are perceptible off-site. The threshold of perceptibility for ammonia is approximately 0.5 ppm, or about 350 $\mu g/m^3$ (National Academy of Sciences, 1979). Up to 20 pounds of ammonia could "slip" through the NO_x control equipment (i.e., SCR) and be emitted from each HRSG per hour. Based on the dispersion modeling results

(See Table 3.2-9), this maximum emission rate would result in a ground-level hourly average concentration of approximately 4 μg/m^3. Therefore, ammonia attributable to PMEC would not be perceptible off-site.

3.2.3 CLIMATE, VISIBLE PLUMES, FOGGING, MISTING, ICING

The PMEC design includes two 6-cell and one 7-cell cooling tower. The PMEC cooling tower cells would produce water vapor clouds that vary in size depending on meteorology and operational factors.

An analysis of potential cooling tower impacts was conducted using the Seasonal/Annual Cooling Tower Impact (SACTI, Version 11-01-90) model and meteorological data from Noveon Chemical. These meteorological data were also used in the air quality dispersion modeling assessment for the facility. The conclusions of the modeling analysis are as follows:

- • It is unlikely significant plume-induced ground-level fogging or icing would occur on nearby roads from either cooling tower.
- • Due to the moist climate of the region, long condensed plumes may result during periods of elevated relative humidity. However, such condensed plumes would usually occur during conditions of already poor or obscured visibility. During daytime hours when local weather does not obscure the plume, typical condensed plume lengths would be less than 40 m and heights less than 30 m for both cooling towers.

Appendix B-2, PMEC Cooling Tower Modeling, contains a more detailed description of the modeling analysis of potential cooling tower impacts.

3.2.4 DUST

Because the site is flat, there would be relatively little grading of the site prior to construction. Therefore, dust generated by excavation and grading would be short term. Dust from access roads would be controlled by applying gravel or paving the access road and watering as necessary.

After the PMEC is completed and operational, virtually no dust would be generated on site.

3.2.5 MITIGATION

- To control dust during construction, water would be applied as necessary, access roads would be graveled or paved.
- BACT would be incorporated into the PMEC design to reduce air pollution emissions.

3.3

WAC 463-60-322 Natural Environment Water.

(1) The application shall provide detailed descriptions of the affected natural water environment, project impacts and proposed mitigation measures, and shall demonstrate that facility construction and/or operational discharges will be compatible with and meet state water quality standards.

(2) Surface water movement/quality/quantity. The application shall set forth all background water quality data pertinent to the site, and hydrographic study data and analysis of the receiving waters within one-half mile of any proposed discharge location with regard to: Bottom configuration; minimum, average, and maximum water depths and velocities; water temperature and salinity profiles; anticipated effluent distribution, dilution, and plume characteristics under all discharge conditions; and other relevant characteristics which could influence the impact of any wastes discharged thereto.

(3) Runoff/absorption. The application shall describe how surface water runoff and erosion are to be controlled during construction and operation, how runoff can be reintroduced to the ground for return to the ground water supply, and to assure compliance with state water quality standards.

(4) Floods. The application shall describe potential for flooding, identify the five, fifty, and one hundred year flood boundaries, and describe possible flood impacts at the site, as well as possible flood-related impacts both upstream and downstream of the proposed facility as a result of construction and operation of the facility and all protective measures to prevent possible flood damage to the site and facility.

(5) Ground water movement/quantity/quality. The application shall describe the existing ground water movement, quality, and quantity on and near the site, and in the vicinity of any points of water withdrawal associated with water supply to the project. The application shall describe any changes in surface and ground water movement, quantity, quality or supply uses which might result from project construction or operation and from ground water withdrawals associated with water supply for the project, and shall provide mitigation for adverse impacts that have been identified.

(6) Public water supplies. The application shall provide a detailed description of any public water supplies which may be used or affected by the project during construction or operation of the facility.

[Statutory Authority: RCW 80.50.040 (1) and (12). 04-21-013, amended and recodified as § 463-60-322, filed 10/11/04, effective 11/11/04. Statutory Authority: RCW 80.50.040. 92-23-012, § 463-42-322, filed 11/6/92, effective 12/7/92.]

SECTION 3.3 WATER
(WAC 463-60-322)

The Pacific Mountain Energy Center (PMEC) would have an estimated peak instantaneous water demand of 5,826 gallons per minute (gpm). The annual water usage by PMEC would vary based on the feedstock used and the ambient air temperature, with higher water usage at higher ambient temperatures. The total annual average demand used for design is 9,397 acre-feet per year (af/yr) or 5,826 gpm. For the purpose of this section, the use of the peak water demand as the annual average water demand would result in a conservative design – during colder parts of the year, less water would be used by PMEC than the peak demand would suggest. At present, insufficient information available (including condenser pressure, cooling tower cold water temperature, wet bulb temperature, condenser steam flow, cooling tower range and approach, and other parameters) to estimate cooling tower evaporation, which is the dominant onsite process water user.

Process water would be supplied from the Port of Kalama, and would be treated as necessary to meet plant specifications. Potable water would be supplied by the City of Kalama in distribution lines that have already been installed for the site. The plant would have negligible impacts on surface or ground water resources in the vicinity.

Stormwater runoff would be routed through the site generally to the south and west. Stormwater subject to potential contamination caused by a spill within the plant area would be contained using berms. Water within bermed areas would be routed to an isolated outlet where potential contaminants can be removed prior to discharge to the on-site water quality treatment facility (i.e., wet pond). Surface water collected outside of bermed areas, not subject to potential contamination from a spill, would be routed directly to the water quality treatment facility (i.e., wet pond) via an open ditch or biofiltration swale.

According to the Washington State Department of Ecology (Ecology) Surface Water Management Manual for Western Washington (SWMWW), site stormwater runoff would require only water quality treatment. Stormwater flow control, such as a detention facility, is not required as surface water would either infiltrate or be discharged to the Columbia River.

Presently, the water quality treatment facility conceptual design includes a wetpond, located in the south-central portion of the site. Site soils are generally comprised of fine to coarse well-draining sands. Alternative water quality treatment methods would be evaluated during the design phase of this PMEC. Potential alternatives for water quality treatment include biofiltration swales and infiltration Best Management Practices (BMPs).

3.3.1 SURFACE WATER RESOURCES (MOVEMENT/QUALITY/QUANTITY)

3.3.1.1 Existing Surface Water Conditions

According to the Draft Wetland Mitigation Plan for the site prepared in May 2006 by Anchor Environmental, LLC, the site is relatively flat and generally at an elevation of 22 feet. The site is adjacent to the Columbia River to the west. Within the northwest corner of the site there is a back water channel from the river. This area is termed Wetland A by the Draft Wetland Mitigation Plan. As shown on Figure 3.4-1, Wetland A is adjacent to a site access Drive. It appears that the access Drive currently intercepts most site runoff from entering the wetland.

The Western Regional Climate Center, reports an average annual rainfall of 68 inches at the Kalama Weather Station #454084. Over the approximately 95-acre site, the total volume of precipitation would total approximately 260 acre-feet per year.

No other water features, such as ditches or wet areas, have been noted on the site. The site soils are well-drained and very little runoff or sign of sheet and rill erosion were observed. Because of the lack of water features and observed signs of erosion, it is concluded that site surface water runoff is minimal with a significant portion infiltrating into the well-drained site soils. Excess surface water currently enters the Columbia River via sheet flow to the western property boundary or into the wetland located to the north.

3.3.1.2 Impacts to Surface Water

As indicated on Figure 3.4-1, the wetland located to the north is planned to be filled by the Port of Kalama as part of their long-range management plan for the North Port area. Impacts to the wetland and planned mitigation efforts are included in the Draft Wetland Mitigation Plan (Anchor Environmental, LLC, 2006). Impacts to this wetland are not included as part of this Application.

The remaining impacts to surface water relate to site drainage during and following construction. The highest risk of construction-related impacts to surface water quality is expected to occur in the initial stages of construction, when native soils are stripped to allow for the compacted placement of surcharge piles and permanent fill material. At that time, the highest priority would be to control erosion and sedimentation. Erosion would be controlled by temporarily stabilizing soils with seeding or plastic sheeting. Construction entrances would be stabilized to minimize erosion and reduce the potential for soils to be tracked off site. Sedimentation within the construction site would be controlled using silt fencing, check dams, and other types of Best Management Practices (BMPs). Once temporary BMPs are in place, construction-phase erosion control should be routine and manageable. Construction-related BMPs are further described in Section 2.10.

As construction proceeds, a permanent stormwater management system would be completed. The stormwater management system would be designed according to the Ecology's SWMWW. The design and stormwater site drainage plan would be prepared and submitted for permitting through EFSEC or Ecology.

Water quality would be managed through the use of oil-water separators, wet pond, and/or biofiltration swales. Storm drain and culvert outlets to natural channels would be armored to control erosion and scouring of site soils. Permanent vegetation would be established and other permanent BMPs would be used to control erosion and sedimentation. With all permanent stormwater BMPs in place, operation-related impacts to stormwater are expected to be minor.

The most serious, though unlikely, risk to surface water quality would be an accidental chemical spill during an exceptionally high rainfall event. Surface water would be controlled by containing water within bermed areas; water would later be removed from the site and treated in accordance with regulatory standards. In the unlikely event of a spill leaving the bermed area, contaminants could be captured within the water quality treatment facility for later removal and treatment. Section 2.9 Spillage Prevention and Control outlines spill prevention measures, procedures and reporting requirements.

The natural gas pipeline route, as shown on Figure 2.1-2, would cross the Kalama River using one of two methods: suspension under an existing bridge or by drilling beneath the river. The first proposed method would include securing the pipe to the existing Hendrickson Drive Bridge. It is assumed that the attachment of the pipeline to the bridge would require the use of a barge and crane mobilized in the river. Because the pipe would be suspended over the Kalama River, no surface water impacts are anticipated.

The alternate method of crossing the Kalama River is to use a horizontal directional drill (HDD) to install the pipeline below the river bed. The process includes drilling a pilot hole using a large drill bit and an injection of bentonite slurry under pressure to remove the cuttings and hold the hole open. After the pilot hole is completed, a reamer and bentonite slurry combination is used to enlarge the hole so that the preassembled string of pipe can be pulled back through the hole. This method requires the preparation of an entrance site and an exit site. Some types of substrate are unsuitable for drilling, such as hard fractured rock or sugar sand type soils. An evaluation of the geotechnical conditions along the pipe alignment would be necessary to determine the feasibility of a drilled installation at this site. The pipeline would be buried beneath Hendrickson Drive on either side of the bridge. The pipeline route includes no other water body or wetland crossings. Three other utility drillings exist in the general area. The pipeline would be aligned with the other utilities.

Hydrostatic test water for the natural gas pipeline would be acquired from the Port of Kalama industrial water system or from the City of Kalama municipal water system. If City water is used, the test water would be discharged to the Columbia River. When hydrostatic testing is complete, the test water would be analyzed and treated if necessary to make it suitable for discharge into area drainage ditches in compliance with water discharge permits issued for the PMEC. Hydrostatic test water which has been super-chlorinated for potable water line disinfection would be discharged to a sanitary sewer following reduction in residual chlorine levels. If industrial water is used, it would be tested for nitrogen content before determining its discharge point (surface water, storm sewer, or sanitary sewer). If an appropriate discharge location is not immediately adjacent to any facility being tested, the used test water can be trucked to an appropriate discharge point.

3.3.1.3 Mitigation Measures

Permanent BMPs would be employed to treat the water quality design storm, or the 6-month, 24-hour storm for the site. BMPs include oil-water separators, wetpond and/or biofiltration swales, and permanent vegetation. The stormwater runoff control system would comply with the SWMWW. Peak-flow control and flow duration control are not required for this site because all site stormwater runoff would be conveyed to the Columbia River through a manmade non-erodible system.

3.3.2 RUNOFF/ABSORPTION

3.3.2.1 Existing Runoff/Absorption Conditions

As discussed in Section 3.3.1.1, site soils are well-drained and very little runoff or signs of sheet and rill erosion were observed. This infers that the majority of site stormwater currently infiltrates.

3.3.2.2 Impacts to Runoff/Absorption

The current site is not developed and is comprised of well-draining soils. Following the construction of the PMEC, a portion of the site would be converted from pervious to impervious area. Impervious areas would consist of roads, buildings, parking areas, and covered storage areas, as shown on Figure 2.7-1. As a result, site surface water runoff is expected to increase.

Within areas that would remain pervious, vegetated open space, surface water is expected to infiltrate as it currently does. Newly paved areas route surface water to perimeter ditches or a storm drainage network consisting of inlets, catch basins and storm drain pipes that would collect and convey flows to the wet pond that has been preliminarily sited in the south-central portion of the site. The net impact to absorption on the site is considered negligible.

Run-off impacts would be minimal and are expected to be comparable to other large, non-industrial, impervious site uses such as warehouses, retail centers, or office buildings. The development does not present unusual or unique stormwater runoff challenges.

3.3.2.3 Mitigation Measures

The required BMPs are expected to minimize erosion and control sedimentation. Construction-phase erosion and sedimentation control BMPs, as described in Section 2.10, would be implemented to mitigate the expected impacts of soil disturbance. These may include chemical source control, silt fencing, stabilized construction entrances, street sweeping, straw bale check dams, and rock check dams.

Permanent, operations-phase runoff control and water quality enhancement BMPs, also described in Section 2.10, would be implemented to mitigate the expected impacts of increased runoff rate and pollution from vehicle traffic. These BMPs would include stabilized landscaped areas, paved areas, catch basins, storm drains, vegetated ditches or swales, and a wet pond intended for water quality treatment.

3.3.3 FLOODPLAINS

3.3.3.1 Existing Conditions

The PMEC is located within the 100-year floodplain for the Kalama and Columbia rivers as currently mapped by FEMA. However, this map was based on 1980 elevations and shows the flood elevation at 19 feet. The current site elevation averages approximately 22 feet due to subsequent deposition of dredge soils. Therefore, the current elevation of the site is above the 100-year floodplain and additional mitigation measures for flooding are not planned.

3.3.3.2 Potential for Flooding and Protective Measures

The County Administrator is responsible for determining the extent of the floodplain. All developments within the floodplain require a floodplain management permit and comply with development standards outlined in Cowlitz County Code (CCC) 16.25.080 and 16.25.090.

If it is determined that the site resides within the 100-year flood plain, areas that are potentially subject to damage during periods of high water would be protected with quarry spalls, riprap, flow deflectors or other erosion control practices. Because the site is above the 100-yr floodplain, an evaluation of the change in water surface elevation created by the additional fill placed for site development would not be necessary. This has been confirmed in 1996 as the site was not flooded.

3.3.4 GROUNDWATER RESOURCES

This section describes the hydrogeologic resources at the PMEC site, PMEC impacts, and mitigation.

3.3.4.1 Hydrogeologic Setting

The PMEC property is located along the east side of the Columbia River. The subsurface at the property is described according to boring logs from previous geotechnical reports and a groundwater monitoring investigation. From the surface to a depth of up to approximately 16 feet below ground surface (bgs), the property is composed of fill originating from dredged river sediment. This fill consists of fine to coarse grained sand with traces of silt and fine gravel. Beneath the fill are alluvial flood deposits that are composed of silt and clayey silt, with interbeds of sandy silt, silty sand, and clean fine sand. This flood deposit is reportedly underlain by claystone at a depth of approximately 325 feet bgs. Regional bedrock in this region is composed of volcanic rocks of Mesozoic age.

The groundwater table has been encountered on the PMEC property at depths reported ranging from about 10 to 20 feet bgs. Groundwater table elevations are strongly influenced by the present stage of the Columbia River, due to the property's proximity to the Columbia River and associated tidal flats. Groundwater flow is also influenced by the Columbia River, and therefore, is inferred to be westerly.

3.3.4.2 Impacts

The process water source for the plant would be imported from off-site municipal and industrial sources for which valid water rights are held, and the effluent from the plant would be treated on-site and discharged to the process water outfall at the Port of Kalama. Therefore, no net changes to the on-site ground water are expected to occur as a result of plant operation.

Given the general hydrogeologic conditions, the water resources of the PMEC site primarily consist of the annual rainfall and the Columbia River groundwater system. Construction on the property would affect the discharge fate of some portion of that water. Initially, this would be due to the loss of vegetative cover, which would actually make more water available for runoff. As impermeable cover of the property increases, due to the construction of paved areas and buildings, the water available for initial recharge would decrease and total runoff for the site is expected to increase. Surface water runoff from the site would be treated in a water quality treatment facility (i.e., wet pond). Runoff volumes in excess of the design water quality treatment volumes would be routed directly to the Columbia River. Therefore, impacts to the hydrologic setting within the PMEC site are considered negligible.

3.3.4.3 Mitigation Measures

No impacts have been identified regarding the quantity of water infiltrating the site following construction. BMPs that are recommended for site development include a wetpond and/or biofiltration swales that would allow site stormwater to collect, filter sediments and particulate matter.

In addition, the site development plan would require a Spill Prevention, Control and Countermeasures (SPCC) Plan that would protect ground water (See Section 2.9). If a spill were to occur to ground, impacted soil and ground water would be remediated in accordance with the Model Toxics Control Act (MTCA). With appropriate management practices, including bermed areas for the collection of incidental spills and oil-water separators as required, the potential for contamination of surface or ground water is unlikely. Therefore, mitigation for groundwater quality impacts is not necessary.

3.3.5 PUBLIC WATER SUPPLIES

3.3.5.1 Existing Conditions and Water Authorization

The City of Kalama provides water service to over 1,300 accounts (approximately 3,000 people) inside and outside the city limits of Kalama. The source of water is a Ranney well adjacent to the Kalama River. The water rights associated with this source total 2,284 af/yr on an annual withdrawal basis, and 2,225 gpm on an instantaneous basis. As the well is a groundwater under the influence of surface water (GWI) source, the City of Kalama has constructed a water filtration plant, which also includes chlorination, fluoridation, and pH adjustment. The City of Kalama is currently using its well field (along with thirteen water storage reservoirs) to satisfy all of the water demands of its system. The present municipal water supply should be enough to address growth through the year 2016, at which point the water treatment plant and associated water rights would need to be expanded.

The Port of Kalama has been awarded water rights by the Washington State Department of Ecology. The two separate water rights permits allow the Port a water usage of 3,472 gpm. This would be achieved by drilling Ranney wells to an estimated depth of 200 feet. The Port has also applied to the Ecology for a permit for another 10 million gpd. Ecology has completed the review of senior water rights and has discovered no conflicts or issues. It is anticipated that this additional water right would be granted to the Port in late summer or early fall 2006, allowing the Port to supply PMEC with enough water to operate during all ambient conditions.

3.3.5.2 Impacts to Public Water Supplies

3.3.6 PROPOSED PMEC WATER USAGE

Water consumption by the PMEC facility would vary from month to month, mostly due to higher evaporation from the cooling towers at higher ambient temperatures. Average monthly water usage would vary between a low in the wet cool winter, to a high in the warm dry summer. An average annual demand of 5,826 gpm is assumed, as a conservative estimate. Based on this information, assuming that the Port succeeds in procuring the additional water rights of 10 million gpd, the Port can provide PMEC with sufficient water for any proposed water demand.

3.3.7 WATER SUPPLY DURING CONSTRUCTION

Water supply during construction of PMEC would be purchased from the Port of Kalama and the City of Kalama. Anticipated water uses include spraying roads for dust control, construction support (i.e., concrete curing and hydrostatic testing of equipment), and restroom facilities for an estimated construction and support crew of 400 people. The water demand during the construction phase of the facility is conservatively estimated at 6,000 to 10,000 gpd, with a peak demand of approximately 50 gpm. No adverse impacts to the Port of Kalama or City of Kalama systems are expected. Industrial and potable quality water would be brought to the site via existing pipeline systems at the southeast corner of the proposed PMEC site.

3.3.8 FUTURE CONDITIONS

As the City and Port of Kalama continue to grow, the unused allocation of their water rights would be utilized to meet the increased demand. Twenty year growth projections indicate that the Port of Kalama and City of Kalama water supply resources would have sufficient capacity to meet the increased demand during this period. It is assumed that the City of Kalama water would be used for potable applications at PMEC, while the Port of Kalama water would be used for all industrial purposes (i.e., cooling tower makeup, process water, etc).

The City of Kalama Water System Plan estimates a 141% increase in water demand for its customers in the City of Kalama and Cowlitz County over the next 20 years. The water demand for the PMEC facility is assumed to remain constant from year to year. The Plan reserves 2,284 af/yr for the customers in the City of Kalama, Cowlitz County, the Port of Kalama, the PMEC facility, and non-billed water. Only a minimal quantity of the City's potable water would be required at PMEC. The City's water surplus indicates that on a daily basis the City of Kalama has a sufficient water supply to meet the PMEC potable water demand over the next 20 years without impacting the City's other water customers.

The Port of Kalama has not released information about its estimated future water use over the next 20 years. The water demand for the PMEC facility is assumed to remain constant from year to year. The Port currently reserves 5,600 af/yr for its customers, including the PMEC facility. The Port has applied for another 11,200 af/yr. Assuming that the Port is successful in procuring the additional water rights, the Port would reserve a total of 16,800 af/yr for its customers. As PMEC would (conservatively) consume 9,397 af/yr, the Port of Kalama has sufficient water to supply PMEC, and would have a surplus of 7,404 af/yr for its other customers. This water surplus indicates that on a daily basis, the Port of Kalama has a sufficient water supply to meet the PMEC water demand over the next 20 years, assuming that additional customers do not require more than 7,403 af/yr.

3.3.9 IMPACTS TO PUBLIC WATER SUPPLIES

The City of Kalama and the Port of Kalama public water supply systems have the capability to meet current and 20-year future projection needs of the City and Port. PMEC would be required to provide its own fire storage tank(s) since storage would not be provided by the City. Assuming an adequately sized fire storage tank and based on the estimated 20-year water demand forecasts, the PMEC facility would not have any negative impacts on the City of Kalama or Port of Kalama water supplies.

3.3.9.1 Mitigation Measures

No impacts to public water supplies are expected, and no mitigation measures are required.

3.3.10 PRIVATE WATER SUPPLIES

3.3.10.1 Existing Conditions

Ecology's well logs website was referenced to determine existing wells in the vicinity of the PMEC. Within Section 36, Township 7 North, Range 2 West of the Willamette Meridian, within one mile of the Port of Kalama water supply well, eight wells were identified. Two water supply wells were identified north of the site adjacent to the back water wetland located to the north. Well depths range from 145 to 176 feet and are screened between 105 and 170 feet. Within and to the south of the site, two test wells and four resource protection wells were identified. All wells were drilled to an approximate depth of 100 feet, with values ranging from 94 to 105 feet. Static water levels measured in the northern wells range from 19.9 feet to 22.6 feet, while the southern wells range from 12 to 13 feet.

3.3.10.2 Impacts

Drawdown of aquifer water levels is a local effect that diminishes significantly with distance from the pumping well. It is theoretically possible that withdrawals for the PMEC could create a cone of depression during seasonal low-water periods or drought conditions that could be detected, at which time shallow wells within this area could experience an added decline in water levels. It is unlikely, however, that this decline would be sufficient to impair use of the well.

3.3.10.3 Mitigation Measures

No adverse impacts to private water supplies (water wells) are expected, and no mitigation measures are required.

3.4

WAC 463-60-332 Natural Environment—Habitat, Vegetation, Fish and Wildlife.

The application shall describe all existing habitat types, vegetation, wetlands, fish, wildlife, and in-stream flows on and near the project site which might reasonably be affected by construction, operation, decommissioning, or abandonment of the energy facility and any associated facilities. For purposes of this section, the term "project site" refers to the site for which site certification is being requested, and the location of any associated facilities or their right of way corridors, if applicable. The application shall contain the following information:

(1) Assessment of existing habitats and their use. The application shall include a habitat assessment report prepared by a qualified professional.

(2) Identification of energy facility impacts. The application shall include a detailed discussion of temporary, permanent, direct and indirect impacts on habitat, species present and their use of the habitat during construction, operation and decommissioning of the energy facility. Impacts shall be quantified in terms of habitat acreage affected, and numbers of individuals affected, threatened or removed.

(3) Mitigation plan. The application shall include a detailed discussion of mitigation measures, including avoidance, minimization of impacts, and mitigation through compensation or preservation and restoration of existing habitats and species, proposed to compensate for the impacts that have been identified. .

(4) Guidelines review. The application shall give due consideration to any project-type specific guidelines established by state and federal agencies for assessment of existing habitat, assessment of impacts, and development of mitigation plans. The application shall describe how such guidelines are satisfied. For example, wind generation proposals shall consider Washington state department of fish and wildlife Wind Power Guidelines, August 2003, or as hereafter amended. Other types of energy facilities shall consider department of fish and wildlife Policy M-5002, dated January 18, 1999, or as hereafter amended.

(5) Federal approvals. The application shall list any federal approvals required for habitat, vegetation, fish and wildlife impacts and mitigation, status of such approvals, and federal agency contacts responsible for review.

[Statutory Authority: RCW 80.50.040 (1) and (12). 04-21-013, amended and recodified as § 463-60-332, filed 10/11/04, effective 11/11/04. Statutory Authority: RCW 80.50.040. 92-23-012, § 463.42-332, filed 11/6/92, effective 12/7/92.]

SECTION 3.4 HABITAT, VEGETATION, FISH AND WILDLIFE (WAC 463-60-332)

URS biologists conducted a field survey of the biological resources in the vicinity of the proposed Energy Northwest Pacific Mountain Energy Center (PMEC) and its associated natural gas pipeline and railroad spur routes. The survey assessed the presence of and impacts to biological resources attributable to the development, construction, and operation of the PMEC. Background information was gathered using aerial photographs, the Port of Kalama staff in Kalama, Washington, technical reports, and field investigations conducted on April 11 and 12, and August 31, 2006. Presence and distribution information related to special status species was obtained from National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries), United States Fish and Wildlife Service (USFWS), Washington Department of Natural Resources (WDNR), and the Washington Department of Fish and Wildlife (WDFW).

3.4.1 HABITAT AND VEGETATION

3.4.1.1 Existing Conditions

The vegetation and habitat survey consisted of investigating the PMEC site, the pipeline routes, and the railroad spur alignment. Major habitat types, locations, and plant species observations in the site area were mapped and described (Figure 3.4-1 and Table 3.4-1). Four major habitat types occur in the site vicinity - industrial, open industrial, riparian, and wetland.

The **industrial habitat** type includes those areas that are completely developed with buildings, parking lots, storage yards, and paved or graveled surfaces. There may be small areas of artificial landscaping, but natural vegetation is limited to small roadside swales or shoulders in this habitat type. This industrial habitat type also includes railroad tracks since these areas also contain very little vegetation.

The **open industrial habitat** type consists of heavily disturbed or graded vacant lots and is typically found on the area of the site where Columbia River dredge spoils were deposited. The vegetation in these areas usually consists of non-native and invasive species. This habitat type includes parks and urban open spaces. Common species in the open industrial habitat type includes weedy species such as annual bluegrass (*Poa annua*), English plantain (*Plantago lanceolata*), common groundsel (*Senecio vulgaris*), Thale cress (*Arabidopsis thaliana*), horseweed (*Conyza canadensis*), and crane's bill (*Erodium cicutarium*).

The **riparian habitat** type is located adjacent to the Kalama River and Columbia River. The sections of these rivers located in the site vicinity are tidally influenced freshwater systems. The riparian forest adjacent to the Kalama River is dominated by black cottonwood (*Populus balsamifera*), snowberry (*Symphoricarpos albus*), red-osier dogwood (*Cornus sericea*), and young Oregon ash (*Fraxinus latifolia*). The banks of the Kalama River contain hardhack (*Spiraea douglasii*), wouldows (*Salix* spp.), and reed canarygrass (*Phalaris arundinacea*).

Job No. 33758342

Figure 3.4-1
Habitat Types

URS

Pacific Mountain Energy Center
Kalama, Washington

The **wetland habitat type**, a WDFW priority habitat, consists of palustrine forested, scrub-shrub, and emergent wetlands. Wetlands are associated with drainage ditches, depressions, and the riparian zones of the Kalama River and the Columbia River. Wetlands are discussed in greater detail in Section 3.5, Wetlands.

A query of the WDNR Natural Heritage database located one special status plant species in the site vicinity (WDNR, 2006). Wheeler's bluegrass (*Poa nervosa*), a state sensitive species, occurs in the site vicinity, however, this species grows on rock outcrops, cliff crevices, and occasionally in talus near the base of cliffs or outcrops (WNHP, 2000). While this habitat is present in the general vicinity of the site, it is not immediately adjacent to any of the PMEC component areas.

TABLE 3.4-1
PLANT SPECIES OBSERVED ON PMEC SITE OR ALONG RAILROAD SPUR AND PIPELINE ALIGNMENTS

Scientific Name	Common Name	N/I *	PMEC Site	RailRoad Spur	Pipeline
TREES					
Alnus rubra	red alder	N	x		
Fraxinus latifolia	Oregon ash	N		x	x
Populus balsamifera	black cottonwood	N	x	x	x
Populus nigra	Lombardy poplar	I			x
Prunus sp.	cherry	I	x		
Pseudotsuga menziesii	Douglas-fir	N		x	
SHRUBS					
Arbutus menziesii	madrone	N		x	
Berberis aquifolium	tall Oregongrape	N		x	
Betula sp.	birch	?	x		
Cornus sericea	red-osier dogwood	N	x	x	x
Crataegus douglasii	Douglas hawthorne	N		x	
Cytisus scoparius	Scot's broom	I	x		x
Holodiscus discolor	oceanspray	N		x	
Oemleria cerasiformis	osoberry	N			x
Ribes sanguineum	red-flowering currant	N	x		x
Rosa nutkana	Nootka rose	N			x
Rosa sp.	Rose	N		x	
Rubus armeniacus	Himalayan blackberry	I	x	x	x
Rubus spectabilis	salmonberry	N			x
Rubus ursinus	trailing blackberry	N		x	x
Salix lucida ssp. *lasiandra*	Pacific wouldow	N		x	
Salix sitchensis	Sitka wouldow	N		x	
Salix sp.	wouldow	N	x		x
Sambucus racemosa	red elderberry	N	x	x	x
Spiraea douglasii	hardhack	N		x	x
Symphoricarpos albus	snowberry	N		x	x
Viburnum sp.	viburnum	N		x	

TABLE 3.4-1 (Continued)
PLANT SPECIES OBSERVED ON PMEC SITE OR ALONG RAILROAD SPUR AND PIPELINE ALIGNMENTS

Vinca minor	lesser periwinkle	I	x		
HERBS					
Anaphalis margaritacea	pearly everlasting	N	x		
Arabidopsis thaliana	Thale cress	I	x	x	x
Barbarea orthoceras	American wintercress	N		x	
Bidens sp.	beggarsticks	N		x	
Cardamine hirsuta	hairy bittercress	I	x		
Centaurea biebersteinii	spotted knapweed	I			x
Cerastium glomeratum	sticky chickweed	I	x		
Chicorium intybus	chicory	I	x		
Cirsium arvense	Canada thistle	I	x		
Cirsium vulgare	bull thistle	I	x		
Claytonia perfoliata	miner's lettuce	N	x	x	x
Conium maculatum	poison-hemlock	N			x
Convolvulus sp.	bindweed	I	x		
Conyza canadensis	horseweed	N	x	x	x
Daucus carota	Queen Anne's lace	I	x		x
Digitalis pupurea	foxglove	I			x
Dipsacus sylvestris	teasel	I	x		
Draba verna	whitlow grass	I	x		x
Epilobium ciliatum	Watson wouldowherb	N		x	x
Erodium cicutarium	crane's-bill	I	x	x	x
Galium aparine	cleavers	N	x		
Galium trifidum	small bedstraw	N		x	
Geranium sp.	geranium	?	x		
Geum macrophyllum	large-leaved avens	N			x
Holosteum umbellatum	jagged chickweed	N	x		x
Hydrocotyle ranunculoides	water pennywort	N		x	
Hypericum perforatum	St. Johns-wort	I	x		x
Hypochaeris radicata	hairy cat'sear	I	x		x
Iris pseudacorus	yellow flag	I	x	x	x
Juncus effusus	softrush	N		x	
Lamium purpureum	red deadnettle	I	x		
Lemna minor	lesser duckweed	N		x	
Leucanthemum vulgare	ox-eye daisy	I	x		x
Linaria dalmatica	Dalmatian toadflax	I			x
Lotus corniculatus	birds-foot trefoil	I		x	
Ludwigia palustris	water purslane	N		x	
Lupinus sp.	lupine	?	x		x
Lysimachia nummularia	creeping Jenny	I		x	
Marah oreganus	Oregon bigroot	N		x	
Melilotus sp.	sweetclover	I	x		
Montia howellii	Howell's montia	N			x
Myosotis discolor	forget-me-not	I		x	
Myosotis laxa	forget-me-not	N		x	
Myriophyllum	western milfoil	N		x	

TABLE 3.4-1 (Continued)
PLANT SPECIES OBSERVED ON PMEC SITE OR ALONG RAILROAD SPUR AND PIPELINE ALIGNMENTS

hippuroides					
Nemophila parviflora	small-flowered nemophila	N		x	
Phacelia sp.	phacelia	N		x	
Plantago lanceolata	English plantain	I	x		x
Polygonum cuspidatum	Japanese knotweed	I			x
Potamogeton natans	floating-leaved pondweed	N		x	
Ranunculus aquatilis	white water-buttercup	N		x	
Ranunculus repens	creeping buttercup	I	x		x
Rumex acetosella	sheep sorrel	I	x		
Rumex crispus	dock	I		x	
Rumex obtusifolius	bitter dock	I			x
Senecio jacobaea	tansy ragwort	I		x	x
Senecio vulgaris	common groundsel	I	x		
Sherardia arvensis	field madder	I		x	
Solanum dulcamara	bittersweet nightshade	I		x	
Spergularia rubra	red sandspurry	I			x
Spirodela polyrhiza	greater duckweed	N		x	
Stachys sp.	hedgenettle	I			x
Stellaria media	chickweed	I	x		
Taraxacum officinale	common dandelion	I			x
Teesdalia nudicaulis	shepherd's cress	I	x	x	x
Tragopogon sp.	salsify	I			x
Trifolium arvense	rabbitfoot clover	I	x	x	
Trifolium sp.	clover	I	x		
Typha latifolia	common cattail	N		x	
Urtica dioica	stinging nettle	N	x	x	x
Utricularia macrorhiza	common bladderwort	N		x	
Verbascum thapsus	common mullein	I		x	
Veronica americana	American brooklime	N		x	
Veronica persica	Persian speedwell	I	x		
Veronica scutellata	marsh speedwell	N		x	
Wolffia sp.	watermeal	?		x	
GRASSES, SEDGES, RUSHES					
Agrostis capillaris	colonial bentgrass	I	x		
Agrostis stolonifera	creeping bentgrass	I		x	
Aira caryophyllea	silver hairgrass	I		x	
Bromus tectorum	cheatgrass	I	x	x	
Carex obnupta	slough sedge	N	x	x	
Dactylis glomerata	orchardgrass	I	x		
Digitaria sp.	crabgrass	I	x		
Holcus lanatus	velvetgrass	I	x	x	
Juncus articulatus	jointed rush	N		x	
Juncus effusus	soft rush	N		x	
Juncus tenuis	slender rush	N	x		
Phalaris arundinacea	reed canarygrass	I	x	x	x
Poa annua	annual bluegrass	I			x
Poa bulbosa	bulbous bluegrass	I			x

TABLE 3.4-1 (Continued)
PLANT SPECIES OBSERVED ON PMEC SITE OR ALONG RAILROAD SPUR AND PIPELINE ALIGNMENTS

Vulpia myuros	rat-tail fescue	I		x	
FERNS AND ALLIES					
Athyrium filix-femina	lady fern	N			x
Azolla mexicana	waterfern	N		x	
Equisetum arvense	common horsetail	N	x	x	
Equisetum hyemale	common scouring-rush	N		x	
Polypodium glycyrrhiza	licorine fern	N		x	x
Ricciocarpus natans (liverwort)	purple-fringed riccia	N		x	

*N = native, I = introduced,

PMEC Site

The majority of the PMEC site is composed of the open industrial habitat type. The PMEC site, which is approximately 95 acres, has been disturbed and has been used to pile Mt. St. Helens ash and Columbia River dredge spoils. Common species on the PMEC site include herbaceous species such as rabbit's foot clover (*Trifolium arvense*), crane's bill, velvetgrass (*Holcus lanatus*), chickweed (*Stellaria media*), and sheep sorrel (*Rumex acetosella*). Few woody species are present on the PMEC site with Scot's broom (*Cytisus scoparius*) being the most common.

The PMEC site contains four species listed as Class B Weeds by the Washington State Noxious Weed Control Board: Scot's broom, Queen Anne's lace (*Daucus carota*), hairy cat's ear (*Hypochaeris radicata*), and ox-eye daisy (*Leucanthemum vulgare*). Class B Weeds are non-native species presently limited to portions of the state and are designated for control in regions where they are not yet widespread. None of these species are designated for control in Cowlitz County.

The site also contains five species listed as Class C Weeds by Washington State Noxious Weed Control Board: Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), St. Johns-wort (*Hypericum perforatum*), common groundsel, and reed canarygrass. Class C weeds are already widespread in Washington, but may be designated for control at a local level. Of these species, only Canada thistle is designated for control in Cowlitz County.

The PMEC site also contains a 2.1-acre wetland area that defines the upstream end of a Columbia River backwater channel. The wetland is a tidally influenced, freshwater emergent wetland with slough sedge (*Carex obnupta*) and reed canarygrass. A sloping fringe of black cottonwoods surrounds the emergent community. As part of their long range development plans, the Port of Kalama is proposing to permanently fill this 2.1-acre wetland (Anchor Environmental, 2006). Impacts to this wetland are being addressed under a separate application being filed with the United States Army Corps of Engineers (USACE) by the Port of Kalama of Kalama, Washington. The Port proposed to mitigate for the wetland fill by restoring and creating wetlands immediately to the northwest of the PMEC site.

Natural Gas Pipeline

The natural gas pipeline route mostly contains industrial and open industrial habitat dominated by non-native species. The pipeline would be constructed within the existing road right-of-way for most of its length. It would be either hung over the Kalama River using the existing Hendrickson Drive bridge or drilled under the river at the same location. Thus, the pipeline would also cross over or under riparian habitat. In addition, wetland habitat is present west of Hendrickson Drive and south of an existing rail yard. The pipeline and its associated work zone would remain outside the fence that protects the wetland between Hendrickson Drive and the Columbia River just south of the existing rail yard. This wetland contains emergent, scrub-shrub, and forested communities. However, most of the wetland next to Hendrickson Drive is dominated by reed canarygrass.

The natural gas pipeline route vicinity contains seven Class B Weeds: Scot's broom, Queen Anne's lace, hairy cat's ear, ox-eye daisy, spotted knapweed (*Centaurea biebersteinii*), Dalmatian toadflax (*Linaria dalmatica*), and tansy ragwort (*Senecio jacobaea*). The route also contains two Class C Weeds: St. Johns-wort and reed canarygrass. Of these species only tansy ragwort is designated for control in Cowlitz County.

Railroad Spur

The railroad spur site area contains wetland and open industrial habitat types. The open industrial habitat lies between the PMEC site and the wetland. The wetland is approximately 8.86 acres in size and lies between Tradewinds Road and the BNSF Railroad. This wetland is described in greater detail in Section 3.5, Wetlands.

During the August 31, 2006 site investigation, water pennywort (*Hydrocotyle ranunculoides*) was observed scattered in the wetland. This plant is a State Sensitive species that grows on muddy substrates that are often inundated for part of the year. Washington is at the northern edge of the range for this species in western North America.

The railroad spur site area contains one Class B Weed, tansy ragwort, and one Class C Weed, reed canarygrass. Of these species only tansy ragwort is designated for control in Cowlitz County.

3.4.1.2 Impacts

PMEC Site

Construction of the PMEC site would have low habitat impacts by shifting the habitat type on-site from open industrial to industrial. The site is already very disturbed and dominated by non-native plant species. Noxious weeds are already present on the site and are not anticipated to spread further by the development. In fact, many of the noxious weeds on-site would be removed by the development.

Natural Gas Pipeline

Construction of the natural gas pipeline would mostly impact industrial and open industrial habitats. Construction of the natural gas pipeline is not expected to impact wetland and riparian habitat. The pipeline would be constructed within the existing road right-of-way for most of its length. The pipeline and its associated work zone would remain outside the fence that protects the wetland between Hendrickson Drive and the Columbia River just south of the existing rail yard. The proposed route would follow Hendrickson Drive north and a constructed levee west around the Kalama River's south shore. It would be either hung over the Kalama River using the existing Hendrickson Drive bridge or directionally drilled under the river at the same location. From the bridge it would continue along Hendrickson Drive to the PMEC site. This route would avoid any wetland impacts to the riparian wetland on either side of the Kalama River and the 8.86-acre wetland just southeast of the PMEC site.

Noxious weeds are present along the natural gas pipeline. Only one of the species observed is designated for control in Cowlitz County. However, there is potential for the weed species to spread into areas where they are not currently present. For example, spotted knapweed is present at the southern end of the natural gas pipeline route, just south of the park. There is a potential to spread this plant further along the natural gas pipeline route during construction.

Railroad Spur

Construction of the railroad spur would impact open industrial and wetland habitats. The railroad spur would fill approximately 3.2 acres of wetland. The wetland impacts are discussed in Section 3.5, Wetlands. The water pennywort population would also be lost by the railroad spur construction. Noxious weeds are present in the railroad spur area, but are not anticipated to spread further since the spur is short and leads directly to the PMEC site.

3.4.1.3 Mitigation Measures

The mitigation sequence is avoidance, minimization, and compensation. Many impacts to high quality habitats have been avoided by siting the development in an area that is already largely industrial. The development would also minimize impacts to the riparian habitat adjacent to the Kalama River by either drilling under the river or suspending the pipeline from a bridge.

To minimize the spread of non-native species all machinery would be washed before working in or adjacent to sensitive habitats (wetlands and riparian area).

Impacts to wetland habitats from construction of the railroad spur would require mitigation. This is discussed in Section 3.5, Wetlands.

3.4.2 FISH

3.4.2.1 Existing Conditions

Columbia and Kalama Rivers

The Columbia River, adjacent to the PMEC site at River Mile (RM) 73 , is used by anadromous salmonids primarily as a migratory route between upstream spawning areas and the Pacific Ocean. Any of the species using the river may be assumed to use a back water channel habitat located to directly north of and extending into the PMEC site for rearing, refugia, and foraging. The Kalama River, also supports anadromous salmonids. A total of 14 threatened or endangered fish populations were identified to occur adjacent to the site. The evolutionarily significant units

(ESUs) or distinct population segments (DPS) of the salmonid species protected under the Endangered Species Act (ESA) that are present in these rivers at various times of the year are provided in Table 3.4-2. Brief life history discussions are provided below.

TABLE 3.4-2
THREATENED AND ENDANGERED FISH SPECIES POTENTIALLY PRESENT WITHIN EACH PMEC COMPONENT

Common Name/ Scientific Name	Evolutionarily Significant Unit (ESU) or Distinct Population Segment (DPS)	Federal Status	PMEC site	RailRoad Spur	Kalama River Pipeline Crossing
Chinook Salmon (*Oncorhynchus tshawytscha*)	Upper Columbia River Spring-run ESU	E	M[1]	No	*
	Lower Columbia River ESU	T	M[1], R[1]	No	*
	Upper Wouldamette River ESU	T	M[1]	No	*
	Snake River Spring/Summer run ESU	T	M[1]	No	*
	Snake River Fall-run ESU	T	M[1], R[1]	No	*
Coho Salmon (*O. kisutch*)	Lower Columbia River ESU	T	M[1], R[1]	No	*
Chum Salmon (*O. keta*)	Columbia River ESU	T	M[1], R[1]	No	*
Sockeye Salmon (*O. nerka*)	Snake River ESU	E	M[1]	No	*
Steelhead (*O. mykiss*)	Upper Columbia River DPS	T	M[1]	No	*
	Middle Columbia River DPS	T	M[1]	No	*
	Lower Columbia River DPS	T	M[1]	No	*
	Upper Wouldamette River DPS	T	M[1]	No	*
	Snake River Basin DPS	T	M[1]	No	*
Bull Trout (*Salvelinus confluentus*)	Columbia River DPS	T	M[1]	No	*

E=Endangered
T=Threatened
[1]Under existing conditions, these species may use the backwater channel as refugia or foraging habitat while migrating (M) and/or rearing (R), however, this area of the property would be filled prior to the PMEC construction and is being permitted in a separate process by the Port of Kalama.
*These species may be present in the Kalama River in the PMEC vicinity at various times of the year either as drop-ins or strays. Drop-ins are defined as those species that are native to another basin, but enter a non-native basin temporarily (they do not stay to spawn). Strays are also native to another basin, but stay and spawn in a non-native basin. Any of the fish from the above-listed ESU/DPS's may be present in the Kalama River near the crossing depending on the time of year and water temperatures in the mainstem river. The most likely drop-ins are steelhead.

Chinook Salmon

The general life history of anadromous Chinook salmon includes both freshwater and saltwater phases of development. Incubation, hatching, and emergence occur in freshwater, followed by migration to the ocean, at which time smoltification occurs. After several years, maturation is initiated and adults return to freshwater habitats to spawn in their natal streams. Stream-type Chinook salmon spend extended periods in freshwater before smoltification, in contrast to the ocean-type that emigrates to the ocean as sub-yearling smolts.

Adult Chinook generally enter the Lower Columbia River from March through July, with the exception of the Snake River fall Chinook ESU, which enter the river from August through September. Adults generally occur in the deeper water in the main channel of the river. Juvenile Chinook, particularly subyearling Chinook, are generally oriented closer to shore in water less than two meters (6.6 feet) deep, and where currents do not exceed one foot per second (NMFS, 2005a). Juvenile Chinook may reside and rear in back channels of the Lower Columbia River estuary prior to entering the ocean. In the mainstem river, they are most likely to be found just a few feet from shore, beneath pier structures where water velocity is lower (NMFS, 2005b).

The lower Columbia River (including the waters adjacent to the PMEC site) is designated critical habitat for rearing and migration for all five of the following Chinook salmon ESUs that are present adjacent to the PMEC site.

Upper Columbia River Spring Chinook. This ESU includes all naturally spawned stream-type Chinook salmon and their progeny above Rock Island Dam on the Columbia River, including those in the Wenatchee, Entiat, and Methow Rivers, but excluding the Okanogan River. Under the ESA, this ESU is listed as endangered. Six spring-run Chinook hatchery stocks (Chiwawa, Methow, Twisp, Chewuch, White River, and Nason Creek) are considered part of this ESU. At least six populations of spring-run Chinook salmon in this ESU have become extinct, and almost all remaining naturally-spawning populations have fewer than 100 spawners (Myers et al., 1998). This ESU represents an important genetic resource, in part because it presumably contains the last remnants of the gene pools for populations from the headwaters of the Columbia River (Myers et al., 1998). Upper Columbia River spring Chinook salmon ESU juveniles typically pass the upriver dams in early April and migration generally peaks in mid-May. It is likely that juvenile Chinook pass by the site area from April until the early part of July. This population of Chinook would use the Columbia River in the vicinity of PMEC during migration (inbound adults and ocean-bound juveniles).

Lower Columbia River Chinook. The Lower Columbia River Chinook salmon ESU consists of Oregon and Washington populations that are primarily hatchery-produced. Under the ESA, this ESU is listed as threatened. Populations within this ESU exhibit wide variation in outmigration timing due to variation in spawning timing (fall and spring runs) and water temperatures. The majority of juveniles migrate downstream as subyearlings following emergence, which may occur as early as December. Two peaks in juvenile outmigration through the project area would likely occur in mid-March to mid-April and late August through September. Depending on the river of origin, these Chinook would use the Columbia River in the vicinity of PMEC for both migration and rearing and would be present in the Kalama River.

Upper Wouldamette River Chinook. The ESU includes all naturally spawned populations of spring-run Chinook salmon in the Clackamas River and in the Wouldamette River (confluence with the Columbia River is near Portland, Oregon), and its tributaries, above Wouldamette Falls, Oregon, as well as seven artificial propagation programs. Under the ESA, this ESU is listed as threatened. Wouldamette River Chinook would pass by the PMEC site during their inbound and outbound migrations.

Snake River Spring/Summer Chinook. This ESU includes all naturally spawned populations of spring/summer-run Chinook salmon in tributaries to the Snake River upstream of the Snake and

Columbia River's confluence, including the following subbasins: Tucannon River, Grand Ronde River, Imnaha River, and Salmon River. Under the ESA, this ESU is listed as threatened. Populations in this ESU emigrate to the ocean as yearlings and mature at ages four and five (Myers et al., 1998). Snake River Chinook would pass by the PMEC site during their inbound and outbound migrations.

Snake River Fall Chinook. This ESU includes all naturally spawned populations of fall-run Chinook salmon in the mainstem Snake River and any of the following subbasins: Tucannon, Grande Ronde, Imnaha, Salmon, and Clearwater Rivers. Under the ESA, this ESU is listed as threatened. Snake River Chinook would pass by the PMEC site during their inbound and outbound migrations.

Coho Salmon

Generally, West Coast coho salmon enter rivers in October and spawn from November to December, and occasionally into January, but adults can enter the Columbia River early (entering in July) or late (spawning in March) (Weitkamp et al., 1995). Ellis (1999) reported coho in November and December on their upstream migration past West Hayden Island, located upstream of the PMEC site between river mile (RM) 102 and RM 125. Peak outmigration may vary by as much as a month, but generally occurs in May (Weitkamp et al., 1995). Downstream migration past West Hayden Island begins mid-April, peaks in May, and tapers off in mid-June (Ellis, 1999). A wide variety of artificially and naturally influenced conditions such as habitat condition, flow control, and nearshore ocean conditions may affect outmigration timing.

Lower Columbia River Coho Salmon. The ESU includes all naturally spawned populations of coho salmon in the Columbia River and its tributaries in Washington and Oregon, from the mouth of the Columbia up to and including the Big White Salmon and Hood Rivers, and includes the Wouldamette River (confluence near Portland, Oregon) to Wouldamette Falls, Oregon, as well as twenty-five artificial propagation programs. Under the ESA, this ESU is listed as threatened.

Critical habitat has not yet been developed for this ESU.

Chum Salmon

Chum salmon in the Columbia River are limited to areas downstream of Bonneville Dam. Adults enter the Columbia River to return to their spawning grounds during the fall months. Chum spawn in the lowermost reaches of rivers and streams, generally in shallower, slower running streams and back channels more frequently than do other salmonid species, and are even known to spawn in the intertidal zones of streams at low tide (Johnson et al., 1997).

In contrast to other salmonids, chum salmon generally begin migrating to estuarine and ocean waters immediately after hatching. The species has only a single sea-run form and lives in freshwater for a brief period of time. Juvenile chum salmon begin their outmigration immediately upon emergence and likely move past the PMEC site between early March and late April.

Chum salmon spawn in the main channel of the Columbia River upstream of the PMEC site, between RM 113 and RM 114, near RM 123, between RM 136 and RM 139, and near Ives Island (RM 143) (NMFS, 2005b). Juvenile chum, like other juvenile salmonids, feed in estuaries before beginning long distance ocean migrations. Chum may reside in the estuary for a period of a few hours to a few weeks, depending primarily on foraging success and age (Johnson et al., 1997).

Columbia River Chum Salmon. The ESU includes all naturally spawned populations of chum salmon in the Columbia River and its tributaries in Washington and Oregon, as well as three artificial propagation programs. There are 20 watersheds within the range of this ESU. Under the ESA, this ESU is listed as threatened.

The lower Columbia River (including the waters adjacent to the PMEC site) and the lower three miles of the Kalama River is designated critical habitat for Columbia River chum salmon (Streamnet, 2006).

Sockeye Salmon

Sockeye salmon differ from other species of salmon because they require a lake environment for part of their life cycle. Although spawning occurs in the gravel of the streams, the fry migrate upstream or downstream to the lake environment soon after they emerge. They occupy this habitat during their stay in freshwater, which is typically one to two years.

Adult Snake River sockeye enter the Columbia River in June and July, and spawning typically peaks in mid-October. The majority of sockeye salmon spawn either in inlet or outlet streams of lakes or in lakes themselves. After emerging, juveniles may rear within lakes for one year before migrating to sea. Some sockeye salmon populations spawn in rivers and use low-velocity sections of rivers for juvenile rearing. Juvenile sockeye generally rear in lakes or backwaters of rivers.

Snake River Sockeye Salmon. This inland ESU includes populations of sockeye salmon from the Snake River Basin, Idaho (extant populations occur in the Stanley River subbasin). Under the ESA, this ESU is listed as endangered. Sockeye salmon are native to the Snake River and historically were abundant in several lake systems in Idaho and Oregon. In this century, a variety of factors (including overfishing, irrigation diversions, obstacles to migrating fish, and eradication through poisoning) have led to the demise of all Snake River sockeye salmon except those returning to Redfish Lake in the Stanley Basin of Idaho (Waples et al., 1991).

Designated critical habitat includes Columbia estuarine and river reaches presently or historically accessible from a straight line connecting the ends of the South and North Jetties at the mouth of the Columbia River, upstream to the confluence with the Snake River at RM 168.

Steelhead

The life history of the steelhead trout varies more than that of any other species of Pacific salmonid. They can be anadromous or freshwater resident and under some circumstances, apparently yield offspring of the opposite form (Busby et al. 1996). Resident forms are usually called rainbow, or redband trout. Those that are anadromous can spend up to seven years in freshwater prior to becoming smolts and migrating to the ocean. Steelhead trout would travel as far as 1,200 miles upstream to their spawning grounds. This species has the ability to spawn more than once whereas all other species of *Oncorhynchus*, except coastal cutthroat trout (*O. clarki clarki)*, (in the northwestern U.S.) spawn once and then die (Busby et al., 1996). All steelhead in the Columbia River upstream from The Dalles Dam are summer-run, inland steelhead (Schreck et al., 1986; Reisenbichler et al., 1992; Chapman et al., 1994). Summer-run steelhead are maturing as they enter the stream from May through November and spawn between March and June of the following year.

Adult steelhead may be found near the PMEC site year-round, but the peak of upstream migration generally occurs between mid-January and mid-March, and again between the beginning of May and middle of September (Ellis, 1999).

Available data suggest that most wild steelhead populations smolt at two years of age (Busby et al., 1996). Juveniles from the Upper Columbia River DPS migrate downstream past Bonneville Dam between mid-May and late June. These juveniles would be expected to pass the PMEC site within a couple of weeks of passing the dam. Juveniles from the Snake River Basin steelhead DPS move downstream in a similar timing pattern. Downstream migration typically peaks in late April/early May and declines through late June. The Middle Columbia River juvenile steelhead DPS downstream migration occurs from late March through June, peaking from late April through mid-May. Peak Lower Columbia River juvenile steelhead downstream migration occurs from May through June.

The Columbia and Kalama Rivers, in the vicinity of the PMEC site, fall within the Lower Columbia River/Clatskanie Subbasin Critical Habitat Unit for Lower Columbia River steelhead. The Lower Columbia River also constitutes a designated rearing and migration corridor for the Upper Columbia River, Middle Columbia River, Upper Wouldamette River, and Snake River Basin DPSs of steelhead trout.

Upper Columbia River Steelhead. This inland DPS includes all naturally spawned populations of steelhead and their progeny in the Columbia River Basin upstream from the Yakima River, Washington, to the U.S.-Canada border. Under the ESA, this DPS is listed as endangered. Life history characteristics for Upper Columbia River Basin steelhead are similar to those of other inland steelhead DPSs; however, some of the oldest smolt ages for steelhead (up to seven years) are reported from this DPS (Busby et al. 1996).

Middle Columbia River Steelhead. This DPS includes all naturally spawned populations of steelhead and their progeny in the Columbia River Basin from above the Wind River in Washington (RM 154.5) and the Hood River in Oregon (exclusive) upstream to, and including, the Yakima River, Washington. Steelhead of the Snake River Basin are not included in this DPS (Busby et al., 1996). Under the ESA, this DPS is listed as threatened. Life history information for steelhead of this region indicates that most middle Columbia River steelhead smolt at two years and spend one to two years in saltwater prior to re-entering freshwater, where they may remain up to a year prior to spawning (Howell et al., 1985; BPA, 1992).

Lower Columbia River Steelhead. The DPS includes all naturally spawned anadromous *O. mykiss* (steelhead) populations below natural and manmade impassable barriers in streams and tributaries to the Columbia River between the Cowlitz and Wind Rivers, Washington (inclusive), and the Wouldamette and Hood Rivers, Oregon (inclusive), as well as ten artificial propagation programs. Excluded are *O. mykiss* populations in the upper Wouldamette River Basin above Wouldamette Falls, Oregon, and from the Little and Big White Salmon Rivers, Washington. Under the ESA, this DPS is listed as threatened.

Upper Wouldamette River Steelhead. The DPS includes all naturally spawned anadromous *O. mykiss* (steelhead) populations below natural and manmade impassable barriers in the Wouldamette River, Oregon, and its tributaries upstream from Wouldamette Falls to the Calapooia River (inclusive). The Wouldamette River flows into the Columbia River near Portland, Oregon. Under the ESA, this DPS is listed as threatened.

Snake River Steelhead. This inland DPS includes all naturally spawned populations of steelhead and their progeny in the Snake River Basin of southeast Washington, northeast Oregon, and Idaho. Under the ESA, this DPS is listed as threatened. Snake River Basin steelhead enter freshwater from June to October and spawn during the following spring from March to May. Snake River Basin steelhead usually smolt as two or three year olds.

Bull Trout

Bull trout exhibit resident and migratory life history strategies through much of the current range. Resident bull trout complete their entire life cycle in the tributary (or nearby) streams in which they spawn and rear. Migratory bull trout spawn in tributary streams where juvenile fish rear from one to four years before migrating to either a lake (adfluvial), river (fluvial), or in certain coastal areas to saltwater (anadromous), where maturity is reached in one of the three habitats (USEPA, 1998). Bull trout are found primarily in colder streams, although individual fish are found in larger river systems throughout the Columbia River Basin (USEPA, 1998). Strict cold water temperature requirements make bull trout vulnerable to activities that warm spawning and rearing waters.

Columbia River DPS. The Columbia River DPS occurs throughout the entire Columbia River Basin and its tributaries, excluding bull trout found in the Jarbidge River, Nevada. All bull trout populations in the coterminous United States are listed as threatened by the USFWS. The Columbia River population segment is represented by relatively widespread subpopulations that have declined in overall range and numbers of fish. A majority of Columbia River bull trout occur in isolated, fragmented habitats that support low numbers of fish and are inaccessible to migratory bull trout. The decline of bull trout is primarily due to habitat degradation and fragmentation, blockage of migratory corridors (by flood control structures, dams, and water diversions), poor water quality, past fisheries management practices, and the introduction of nonnative species. Historically, bull trout are estimated to have occupied about 60 percent of the Columbia River Basin, and presently occur in 45 percent of the estimated historical range (USEPA, 1998). The Columbia River DPS is significant because the overall range of the species would be substantially reduced if this discrete population were lost.

Bull trout, if present, would be from entrained Lewis River or Hood River populations that have come down from Bonneville Dam. Lewis River bull trout have no way back to their spawning habitat in the Lewis River due to impassable mainstem dams. The next closest bull trout populations are in the Deschutes and McKenzie River drainages and are unlikely to occur in the Columbia River below Bonneville Dam. Bull trout are occasionally seen in the Sandy River and may be present as drop-ins in the Kalama River.

PMEC Site

All of the aforementioned fish species would be present in the Columbia River adjacent to the PMEC site and there is only one area on the PMEC site potentially suitable for fish presence. Approximately 2.1 acres of wetland encroaches onto the PMEC site in the northwest corner. This wetland is the southern end of a large backwater channel of the Columbia River that supports native fish and salmon species with federal and state protected status (Cowlitz County, 2005). There may be threatened and endangered salmonid species rearing in the backwater channel (wetland) at any time of the year or using the backwater channel during migration (Anchor Environmental, 2006). This wetland would also be considered Essential Fish Habitat (EFH) for Chinook and coho salmon in the U.S. Geological Survey Hydrologic Unit Code (USGS HUC 17080003 [Lower Columbia-Clatskanie River]).

As part of their long-range development plans, the Port of Kalama (Port) has proposed to fill the 2.1 acres of wetland located in the northwest corner of the PMEC site. The Port is planning to mitigate impacts by creating an off-site 4.5 acre forested, scrub-shrub, and emergent wetland habitat (with a surface water connection to another Columbia River backwater channel) north of the proposed PMEC site. This wetland fill and permitting are not part of this Application. Therefore, in the absence of this wetland, there are no other surface water areas (e.g. streams or otherwise) on the PMEC site.

Natural Gas Pipeline

One river would be crossed along the natural gas pipeline route. The proposed gas pipeline would cross the Kalama River either by horizontal directional drilling under the Kalama River or it would be hung on the Hendrickson Drive bridge over the Kalama River, then continue along Hendrickson Drive to the PMEC site. Of the 14 ESU/DPS salmonids occurring adjacent to the PMEC site in the Columbia River, only five of those would be expected in the Kalama River: Lower Columbia River Chinook, Lower Columbia River Coho, Columbia River Chum, Lower Columbia River Steelhead, and Columbia River Bull Trout (Table 3.4-2). The other species are expected to migrate past the PMEC site and not enter the Kalama River. However, as mentioned in Table 3.4-2, any of the aforementioned species may be present at any time in the Kalama River as drop-ins or strays.

The pipeline would travel within Port land and under or alongside Hendrickson Drive; the adjacent land use is predominantly industrial, with a section of park including a marina. The majority of the route is within Cowlitz County, with a small portion within the boundaries of industrial lands of the City of Kalama. The EFH and ESA fish species present at the Kalama River crossing are the same as listed above under the PMEC site, with the exception of all Snake

River ESU/DPS, which would not likely enter the Kalama River, but rather migrate past the Kalama River during their upriver/downriver migrations within the Columbia River.

Railroad Spur

Construction of the railroad spur as proposed would permanently fill about 3.2 acres of palustrine wetland associated with the 8.8-acre wetland complex southeast of the proposed PMEC site. Filling a portion of this wetland complex and rerouting existing culverts draining to the wetland would also impact the remaining approximately 5.6 acres of scrub-shrub and forested communities. This large open water wetland was investigated for fish presence and accessibility during the field visit in April 2006.

The wetland is approximately 30 feet wide with an unknown depth. The temperature in the wetland at the time of the survey was 60°F (16°C). The substrate along the banks was muddy with dead reed canarygrass. The wetland drains to an open water riparian area east of the large Columbia River backwater side channel and due north of the PMEC site. The culvert that drains the wetland (and passes underneath both the railroad tracks and the road) is currently a fish passage barrier due to a large debris jam at the upstream end consisting of large wood and leftover railroad ties. There is water flowing out of the wetland, over and under the debris jam, and into the culvert. This debris jam functions like a dam in that water backs up behind the jam thus creating a large open water area (wetland). It is not completely preventing water flow however, only restricting the flow volume and velocity.

The debris jam consists of a four-foot drop at the wetland outlet. If the debris jam was cleared, the elevation of the open water wetland would decrease by four feet. Under current conditions, this debris jam has created a barrier to fish passage due to the four-foot drop out of the wetland and into the culvert. There is no plunge pool present and therefore, no means for anadromous ESA-listed salmonids from the Columbia River to be present within this wetland. Fish species observed in the wetland during the time of the survey include the mosquito fish (*Gambusia affinis*). The mosquito fish is a small guppy-like fish used to control mosquito larvae and has no federal or state protected status.

3.4.2.2 Impacts

PMEC Site

The construction of the plant would have no effect on threatened and endangered fish species because none are present on the PMEC site. EFH and ESA-listed species currently present in the wetland, a backwater channel of the Columbia River, along the north edge of the PMEC site would be adversely affected by the wetland fill proposed by the Port. This wetland fill, however, is under a separate permitting process and is not part of this Application. Therefore, the PMEC would have no impact on EFH, ESA-listed fish species, or critical habitat since the Port's proposed wetland fill and associated impacts have already been addressed in the Port's proposed long-term planning and associated wetland fill and permitting.

The operation of the plant facility may impact, but is not likely to adversely impact listed fish species. The plant requires a combination of petroleum coke (petcoke) or coal and oxygen as fuel for operation. Petcoke and/or coal may be delivered to the PMEC site via the Port of Kalama's dock located adjacent to the PMEC site. This dock is owned, permitted, and operated by the Port of Kalama. The operation of the PMEC could result in an increase in ship or barge traffic (34 round-trips per year) in the lower Columbia River (up to the Port of Kalama). In 2004, there were 261 port calls for the Port of Kalama compared to 1495 for Portland, Oregon (Merchants Exchange, 2004).

Stormwater would be collected into an on-site wet pond and treated for water quality according to the Washington State Department of Ecology (Ecology) Stormwater Management Manual for Western Washington (SWMMWW_ (February 2005). Certain areas of the site would be bermed and these areas (if not contaminated) would be pumped into the wet pond or pumped out via a sump (if contaminated) and disposed of at an approved location. The final design would address the 6-month, 24-hour storm, the 10-year, 24-hour storm, and the 100-year, 24-hour storm as required, and would conform to Ecology's SWMMWW in effect at the time. It is proposed that a pair of geomembrane-lined stormwater channels be constructed, one on either side of the berm separating the gasification area from the combined-cycle area. These channels would be suitably sloped so as to direct site stormwater towards a stormwater water quality treatment facility (i.e., wet pond), which would be located in the south central portion of the site. All site stormwater, from the bermed areas and from the balance of the site, would be directed to this water quality treatment facility (i.e., wet pond). Then, after treated stormwater would flow to the Columbia River for discharge.

The power plant would be water cooled and would use water from existing wells owned and operated by the Port. The total blow down water from the cooling tower and HSRG would range from approximately 832 gallons per minute (gpm). In addition to the stormwater, other waters leaving the site include the spent process waters (i.e., cooling tower blowdown with minor contributions of wastewater from the HRSGs, demineralizers, and gasification island wastewater) and the PMEC's sanitary sewage. The process wastewater would be discharged to an on-site treatment plant, if one is required to comply with Washington State water quality standards. The discharge from the PMEC would be sampled and tested before joining other discharges at the Port of Kalama's discharge system at the Mixing Vault for Domestic and Industrial Wastewater as described in Section 2.7 and 2.8 of this application. The PMEC's sanitary sewage would be discharged to the Port's domestic wastewater treatment facility located in the North Port area, and then to the Columbia River under conditions contained in National Pollutant Discharge Elimination System Permit No. WA0040843.

Natural Gas Pipeline

The natural gas pipeline would cross the Kalama River using one of two methods: suspension under an existing bridge or HDD. The first proposed method would hang the pipeline beneath an existing bridge. It is assumed that the attachment of the pipeline to the bridge would require the use of boats and perhaps a crane in the river. The location of the existing bridge is near a public boat ramp where vessel traffic is common. A staging area for equipment would be located near the bridge. Drilling into the existing bridge to attach screws and/or bolts would release an extremely small amount of fine dust (from the drill holes) into the river below. This dust would not be detectable or measurable, or result in any impact to ESA-listed species. The use of boats and equipment in the river does increase the potential for a fuel spill or leak. The use of best management practices (BMPs) with proper maintenance on the vessels should prevent any contaminant leak or spill. This method of stream crossing is the least invasive and provides the least opportunity for impacts to ESA-listed species and EFH. No impacts to ESA-listed species, critical habitat, or EFH would occur from the use of the pipeline once the plant facility is in operation.

The other method of crossing the Kalama River is to use HDD and install the pipeline below the river bed. Horizontal Directional Drilling (HDD) is a method of installing a pipeline underground by drilling a slightly over-sized hole at a very shallow angle under surface features and pulling a pre-assembled string of pipe through that hole. Pipe used for HDD has an additional 40-mm Lily 20/40 Lockguard protective coating to prevent damage to the pipe. This method requires the preparation of an entrance (i.e., drill) site and an exit site. The process includes drilling a pilot hole using a drill bit and an injection of bentonite slurry under pressure to remove the cuttings and hold the hole open. After the pilot hole is completed, a reamer and bentonite slurry combination is used to enlarge the hole so that the pipe can be pulled through. Some types of substrate are unsuitable for HDD, such as hard fractured rock or sugar sand type soils.

The entrance site requires an area that is approximately 150 feet to 200 feet long and 100 feet wide on level ground with an "all weather" road access. The exit site requires a rectangular area approximately 100 feet to 175 feet long and 50 feet to 100 feet wide. Similar access is also required, and a pit must be excavated to collect the bentonite slurry discharged from the drill hole. These sites must be located at least 75 feet from the edge of the stream to achieve minimum adequate cover at the boundary of the aquatic feature. The pipeline corridor or other clear area of similar width must extend in a straight line beyond the exit site for a distance slightly greater than the length of the bore. This area is needed to assemble and test the pipe string prior to installation.

Potential impacts resulting from HDD include the temporary loss of upland vegetation from the entry and exit points and the risk of drilling mud entering into the aquatic feature (Kalama River) that the HDD is attempting to avoid (frac-out). A frac-out occurs when the sub-surface ground fractures during the bore and the result is a release (discharge or vent) of drilling mud (bentonite) into the stream channel. Impacts to the aquatic environment include the lethal smothering of all macroinvertebrates in the riverbed substrate, the lethal or sub-lethal impacts to fish species in the water column from either the increased turbidity plume in the water, or the subsequent clean-up method which involves the use of a suction vaccum to remove the bentonite from the water column. Bentonite itself is an inert substance, but when released during a frac-out it has a pudding-like consistency that coats the substrate and smothers the aquatic organisms that do not avoid or cannot avoid the plume.

Impacts from HDD can be minimized or avoided by analyzing the substrate prior to design, replanting cleared staging areas, and not staging in sensitive areas. Impacts to ESA-listed species, critical habitat, and EFH would not occur if the HDD process works as intended. However, if an unpredictable frac-out does occur, the impacts to species and their habitats would depend directly on the quantity of the bentonite released, the extent (area) of the spill, the effectiveness of the clean-up, and the presence or absence of the listed species in the affected area.

Railroad Spur

The railroad spur adjacent to the PMEC site would require the fill of a large wetland located east of the PMEC site and between the road and the railroad tracks. This wetland does not contain ESA-listed fish species because of a blocked culvert that is a migration barrier. The culvert is located beneath the road and railroad tracks (southeast of the PMEC site) and drains the southeast wetland into a larger wetland complex located directly north of the PMEC site. The large wetland complex on the north edge of the PMEC site is an open water wetland and is directly connected to the large backwater channel of the Columbia River. ESA-listed fish species have access into this large wetland complex north of the PMEC site and into the culvert under the road and railroad tracks, but cannot get into the wetland southeast of the PMEC site because of the debris jam at the wetland outlet (culvert inlet). It is unknown if ESA-listed fish ever used this southeastern wetland and it is also unknown as to when the debris jam was created resulting in their exclusion from this area.

Impacts to EFH and ESA-listed fish from the fill of the southeastern wetland would include decreased water quality during construction activity due to sedimentation impacts from the associated fill. During the wetland fill, increased turbidity is expected and this plume of turbid water would flow out of the wetland through the culvert and into the wetland on the north edge of the PMEC site. This impact would be localized to the area immediately adjacent to the culvert outlet and would not extend into the backwater channel or the Columbia River.

3.4.2.3 Mitigation Measures

PMEC Site

There are no EFA or ESA-listed species, or critical habitat on-site (assuming the completion of the Port's planned wetland fill); therefore, no mitigation measures, are necessary. Impacts from PMEC operations (i.e., ship/barge traffic, stormwater run-off, and waste water discharge) would be minor or insignificant and therefore would not require any mitigation measures outside of meeting federal and state permit requirements.

Pipeline Stream Crossing

Both crossing methods:

- All staging and equipment would occur outside of the 100-foot setback distance set to protect the riparian area of the Kalama River.
- Silt fencing would be used to protect the river from sedimentation.
- Disturbed areas would be revegetated with native vegetation.
- Activities that are potentially hazardous to aquatic habitats would not be permitted within the 100-foot restrictive area, including:
  - Fueling or servicing of equipment,

- Storage of any petroleum products, chemicals, or other toxic or deleterious materials,
- Washing of construction equipment, and
- Disposal of waste materials.

For pipeline suspension under existing bridge:

- Waste material during pipeline installation would be captured to the extent possible and not allowed to enter the Kalama River; and
- If over-water equipment (i.e., barge, crane, vessel) is used to install the pipeline, then a containment mechanism (i.e., oil boom or equivalent) must be available or in place in the event of a leak or spill while working over the water.

For HDD crossing method:

- NOAA Fisheries and USFWS may recommend an in-water work window to reduce salmonid exposure to impacts from a potential frac-out during HDD. The in-water work window for the Kalama River is August 1 to August 31 (USACE, 2006).
- Excess excavated material would be removed immediately upon completion of construction to an appropriate upland location away from stream channels or wetlands.
- Excavated materials would be stabilized in a manner to prevent degradation of State waters.

In the event of an unintentional release of drilling mud under pressure into the Kalama River, the following response plan would be implemented.

1. Pre-drilling.

Pipeline construction personnel and inspection staff would be adequately trained prior to construction to identify and use appropriate response materials. Prior to drilling, the following materials would be on-site and available for transport to the HDD location quickly in the event of an unintentional release of drilling mud.

- Vacuum truck with sufficient capacity for an immediate response; arrangements for additional trucks as needed prior to commencing bores,
- Certified Weed Free Straw or hay bales,
- Stakes to secure bales ,
- Silt fence,
- Sand bags,
- Leak-free hose(s) and pump(s),
- Straw logs (wattles, or fiber rolls),

- Heavy-duty push brooms,
- 55-gallon barrels or salvage drums,
- Light tower(s) (if necessary, deliver to site as soon as practicable), and
- Boat with appropriate personal safety equipment, of sufficient capacity to safely conduct clean up from (if necessary, deliver to site as soon as practicable).

A sufficient pumping system would be in place to accommodate all drilling fluids at the bore entry and exit location to contain all drilling fluids within the bore entry and exit pits. During the drilling operations a spotter would be required to visually monitor the crossing at all times. In addition to the visual monitoring, the drill operator would monitor all mud pressure gauges and would immediately cease all operations and send additional crews to assist in the detection and clean up of a frac.

2. Event response.

The following response measures would be implemented upon discovery of the loss of drilling fluid into streams or wetlands:

- Directional drilling would stop immediately.
- The drill fluids would be contained immediately. Types of containment may be straw bales, sediment fence, 55-gallon barrel, culvert, or sandbags. It is up to the Environmental Inspector to determine the appropriate containment method in order to best protect the site-specific resource.
- The following entities would be contacted by phone immediately, but no later than 24 hours: the USACE, Ecology, WDFW, and EFSEC.
- NOAA Fisheries and USFWS would also be contacted in the event of impacts to federally listed species.
- Qualified fisheries biologists would be on alert to conduct fish salvage operations (under the appropriate permits to be acquired prior to construction) in the reach prior to any bentonite removal activities, and block nets would be employed to ensure no fish or other aquatic species reenter the affected area until after the sediments are removed.
    a. Before (and sometimes during) the dewatering of an isolated in-water work area, fish would be captured from the isolated area using trapping, seining, electrofishing, or other methods that minimize the risk of injury to fish. A work area isolation plan and written fish salvage plan would first be prepared and submitted with the application for a fish salvage permit from WDFW and NOAA Fisheries. A fisheries biologist experienced with work area isolation and competent to ensure the safe handling of all ESA-listed fish would conduct or supervise the fish capture and release operation. If electrofishing equipment is used to capture fish, the capture team would comply with the most recent NMFS-approved electrofishing

guidelines (NMFS, 2000), and would handle ESA-listed fish with extreme care, keeping fish in oxygenated water to the maximum extent possible during seining and transfer procedures to prevent the added stress of out-of-water handling. Captured fish would be released in a location that would promote their safe recovery. ESA-listed fish would not be transferred to anyone except NOAA Fisheries or USFWS personnel, unless otherwise approved in writing by the Services.

- Commercially available non-toxic polymers may be used in an attempt to seal the fracture.
- If a fracture cannot be sealed, where practical, the drill pipe would be removed from the existing drill hole to a point where a new drill path can be attempted by drilling out of the existing hole and creating a new hole. A team of the Lead Environmental Inspector, the Chief Inspector, and the Construction Manager would review all information pertaining to the frac and then make a decision to abandon the existing hole and initiate a new bore hole. If the original drill path cannot be utilized, the drill rig would be moved to a new, adjacent location, staff would verify that the new, adjacent location meets the requirements of all applicable project permits and approvals.
- If a frac-out occurs during “pull-back”, adjustments to the pull-back operations would be made to minimize inadvertent returns.
- The following approach would generally be followed after the vent (frac-out) is stopped. Due to the unpredictable nature of the location and environment in which vents may appear, this description cannot encompass all possible approaches to clean up under all conditions. Agency staff and other experts would be consulted with to the extent practicable to develop ad hoc clean up techniques as needed. The following are standard response techniques that would be applied:
- If the bentonite material flows overland prior to entering the Kalama River, installation of silt fencing or sandbag dams at the point of entry would be used to reduce or stop the flow; if the vent is directly into the river, other means to isolate the vent site from the river would be used.
- Using a vacuum truck, with a sufficient hose, personnel would remove the bentonite, working from downstream to upstream, to allow maximum visibility. Hand tools may be used to scarify the sediments and ensure removal to maximum extent practicable.
- If necessary water may be diverted using a coffer dam to isolate the impact area. Only a portion of the river would be diverted to minimize dewatering impacts. Water would be able to pass through the site in its natural condition.
- If it is impracticable to remove the drill fluid from the Kalama River, a clear, written explanation would be submitted to the USACE. The USACE would

coordinate with USFWS and/or NOAA Fisheries. Any fluids left in the stream channel would receive a written approval from the USACE.

- Any disturbed soils would be stabilized immediately.
- Exposed mineral soils would be seeded with native vegetation immediately.
- Disturbance of vegetation would be kept to a minimum and all disturbed vegetation would be restored and/or replanted with native species, to eventually recreate the functional values of the lost vegetation
- Damaged riffle and pool sediment strata would be re-contoured to the extent practicable under the direction of Agency personnel.

The loss of aquatic habitat would be compensated by mitigating at a minimum ratio of 2:1. A mitigation plan would be submitted to the USACE within 7 days of a frac-out occurring. The mitigation plan would include detailed information about the frac-out, how the drill fluid was contained and removed, the amount, if any, of drill fluid left in the Kalama River, the impact area drawn on a map, the location of the mitigation site, type of mitigation to be performed, and types of plantings.

Railroad Spur

To reduce turbidity and downstream impacts from the fill of the southeastern wetland, BMPs and sedimentation minimization measures would be implemented to reduce muddy water from flowing through the culvert and discharging into the wetland complex north of the site. Hay bales, silt fencing, or other methods effective at filtering or diverting the turbid water from discharging through the culvert would be used. In addition, removal of the debris jam at the upstream end of the culvert prior to the wetland fill would allow the wetland to partially dewater, thus further reducing potential turbidity impacts by reducing the volume of water discharging from the wetland.

3.4.3 WILDLIFE

A URS wildlife biologist conducted a field survey on April 11, 2006 to locate and identify wildlife present in or near the proposed project and to review habitat for suitability to various wildlife species. A walking and driving investigation was performed along the pipeline and railroad spur alignments and at the proposed PMEC. Many species likely to be found in the project vicinity were observed during the field investigation (Table 3.4-3). Presence and distribution information related to special status species was obtained from USFWS and the WDFW.

Bald eagles (*Haliaeetus leucocephalus*), purple martins (*Progne subis*), and Columbia white-tailed deer (*Odocoileus virginianus leucurus*) are the only endangered, threatened, or candidate species documented to occur in the PMEC vicinity (USFW,S 2005; WDFW, 2006).

Bald eagles – Bald eagles are large birds of prey that nest and forage along fish-bearing waters. Eagles forage for prey in the Columbia and Kalama Rivers and the extensive wetlands associated with these rivers. Their diet includes fish, marine birds and their offspring, waterfowl and their offspring, small terrestrial mammals, and carrion.

Bald eagles build large stick nests in conifer trees and occasionally in deciduous trees or on cliffs. Nests are often located near the top of the largest tree with an unobstructed view of open water. Nests are most common near marine shorelines but also occur on rivers and lakes. Nesting activity usually occurs in January and February with hatching occurring in April and May. Fledglings would typically leave the nest in mid-July but usually remain at or near the nest until mid-August.

Bald eagles are documented to nest, forage, migrate, and overwinter along the Columbia and Kalama Rivers in the PMEC vicinity.

Purple Martin – Purple martins are cavity nesting insectivores of the swallow family listed as a candidate species in Washington state (WDFW, 2003). This species prefers foraging in open spaces near wetlands and waterways where their preferred prey, flying insects, are commonly abundant.

The population distribution in Washington is limited to coastal areas and the shorelines of the lower Columbia River where nest cavities in pilings and snags are more abundant. Lack of appropriate nesting cavities and competition for available nest sites is a leading cause of population decline. Available maps and documents do not identify purple martins being present in the PMEC vicinity.

Columbia white-tailed deer – Columbia white-tailed deer are a distinct population geographically isolated from other white-tailed deer populations. The deer's preferred habitat includes open and forested riparian zones at low elevations where they forage on herbs and grasses. They also forage along edges of shrub dominated habitat. Populations may have decreased due to habitat destruction in riparian areas through the conversion of preferred habitats to agricultural lands and other uses. Competition with blacktail deer is also a likely reason, because habitat modification of forested habitats above the floodplain has favored blacktail deer.

A small Columbia whitetailed deer population occurs in Cowlitz County, Washington, using riparian habitat along the Columbia River and on islands in the Columbia River. Most of this population is north of, or downstream of, the project. Whitetailed deer have been sighted on Cottonwood Island about 0.5 mile north of the PMEC site.

TABLE 3.4-3
RELATIVELY COMMON WILDLIFE SPECIES THAT MAY BE FOUND IN OR NEAR THE PMEC VICINITY

(Johnson and O'Neil 2001)

Common Name	Scientific Name	Sighting
Birds		
Pied-billed grebe	*Podilymbus podiceps*	
Great blue heron	*Ardea herodias*	X

TABLE 3.4-3
RELATIVELY COMMON WILDLIFE SPECIES
THAT MAY BE FOUND IN OR NEAR THE PMEC VICINITY

Common Name	Scientific Name	Sighting
Double-crested cormorant	*Phalacrocorax auritus*	
Canada goose	*Branta Canadensis*	X
Wood duck	*Aix sponsa*	X
Mallard	*Anas platyrhynchos*	X
Tundra swan	*Cygnus columbianus*	
Blue-winged teal	*Anas discors*	
Cinnamon teal	*Anas cyanoptera*	
Northern shoveler	*Anas clypeata*	
Gadwall	*Anas strepera*	
American wigeon	*Anas Americana*	
Bald eagle	*Haliaeetus leucocephalus*	
Red-tailed hawk	*Buteo jamaicensis*	X
Osprey	*Pandion haliaetus*	X
Virginia rail	*Rallus limicola*	
American coot	*Fulica Americana*	
Killdeer	*Charadrius vociferus*	X
Common nighthawk	*Chordeiles minor*	
Vaux's swift	*Chaetura vauxi*	
Belted kingfisher	*Ceryle alcyon*	X
Downy woodpecker	*Picoides pubescens*	
Northern flicker	*Colaptes auratus*	
Red breasted sapsucker	*Sphyrapicus rubber*	X
Pileated woodpecker	*Dryocopus pileatus*	Evidence of
Violet-green swallow	*Tachycineta thalassina*	
Tree swallow	Tachycineta bicolor	
Barn swallow	*Hirundo rustica*	
Purple martin	*Progne subis*	
Stellar's jay	*Cyanocitta stelleri*	
American Crow	*Corvus brachyrhynchos*	X
Black-capped chickadee	*Parus atricapillus*	
Bushtit	*Psaltriparus minimus*	
Bewick's wren	*Thryomanes bewickii*	
House wren	*Troglodytes aedon*	
Marsh wren	*Cistothorus palustris*	
American robin	*Turdus migratorius*	X
Swainson's thrush	*Catharus ustulatus*	X
European starling	*Sturnus vulgaris*	
Yellow warbler	*Dendroica petechia*	
Common yellowthroat	*Geothlypis trichas*	
Black-headed grosbeak	*Pheucticus melanocephalus*	
Spotted towee	*Pipilo maculates*	
Savannah sparrow	*Passerculus sandwichensis*	
Song sparrow	*Melospiza melodia*	X
White-crowned sparrow	*Zonotrichia leucophrys*	
Dark-eyed junco	*Junco hyemalis*	
Red-winged blackbird	*Agelaius phoeniceus*	

TABLE 3.4-3
RELATIVELY COMMON WILDLIFE SPECIES
THAT MAY BE FOUND IN OR NEAR THE PMEC VICINITY

Common Name	Scientific Name	Sighting
Brewer's blackbird	*Euphagus cyanocephalus*	
Brown-headed cowbird	*Molothrus ater*	
House finch	*Carpodacus mexicanus*	
American goldfinch	*Carduelis tristis*	
House sparrow	*Passer domesticus*	
Mammals		
American opossum	*Didelphis virginiana*	
Shrews	*Sorex spp.*	
Moles	*Scapanus spp.*	
Little brown bat	*Myotis lucifugus*	
Big brown bat	*Eptesicus fuscus*	
Coyote	*Canis latrans*	
Raccoon	*Procyon lotor*	
Striped skunk	*Mephitis mephitis*	
River otter	*Lutra Canadensis*	
Short-tailed weasel	*Mustela erminea*	
Mink	*Mustela vision*	
Deer	*Odocoileus hemionus columbianus*	
Beaver	*Castor Canadensis*	Evidence of
Muskrat	*Ondatra zibethica*	
Deer mouse	*Peromyscus maniculatus*	
Voles	*Microtus sp.*	
Norway rat	*Rattus norvegicus*	
House mouse	*Mus musculus*	
Amphibians		
Pacific treefrog	*Pseudacris regilla*	
Bullfrog	*Rana catesbeiana*	X
Rough-skinned newt	*Taricha granulose*	
Reptiles		
Common garter snake	*Thamnophis sirtalis*	X

3.4.3.1 Existing Conditions

A detailed habitat description of the PMEC site, the pipeline corridor, and the railroad spur are presented in Section 3.4.1 Existing Conditions.

PMEC Site

Open industrial habitat and a small gravel pit in the northwest corner dominate the PMEC site. Song sparrows, crows, and osprey were the only species observed using the PMEC site during the April 11, 2006 site investigation. The sparrows use the Scot's broom for nesting and roosting. A pair of nesting osprey uses a man-made nesting platform installed at the northeast corner of the PMEC site. Ospreys are observed to regularly use the Columbia and Kalama Rivers for foraging. No evidence of other bird species use was found at the PMEC site. Small mammals may use the site for nesting and foraging but no evidence was found to confirm this use. Large mammals may pass along the edges of the PMEC site but there is no suitable forage or cover compared with habitats to the north and east of the PMEC site. There is no suitable habitat at the PMEC site for amphibians or amphibian dispersal. Snakes may search the PMEC site for small mammal or avian prey, especially the project edges and the Scot's broom habitat in the west portion of the PMEC site.

WDFW documents this section of the Columbia River adjacent to the PMEC site between the mouth of the Kalama River at the south and the Columbia River channel east of Cottonwood Island to the north as active overwintering habitat for large concentrations of waterfowl, primarily diving ducks (WDFW, 2006). WDFW documents at least five osprey nests in this same stretch of the Columbia River.

A large tidal wetland complex connected with the Columbia River is situated adjacent to the north boundary of the proposed PMEC site. It provides excellent foraging, migration, and nesting habitat for guilds of diving ducks, dabbling ducks, shorebirds, cavity nesting birds and other waterfowl. A small 2.1-acre lobe of this wetland complex extends into the PMEC site. This small lobe is the southern terminus of a backwater channel. It contains emergent vegetation, no open water habitat, and is flooded only during high tide. It provides some shelter, foraging, and nesting opportunity for mammals and birds. The Port under its long-range planning has proposed to fill this wetland under separate application. Therefore, any impacts and mitigation associated with the Port's planned development are not part of this Application..

One bald eagle nest site is listed to occur about 0.8 mile north of the PMEC site on the east bank of Cottonwood Island in the Columbia River (WDFW, 2006). The line of sight from the nest to the PMEC site is obstructed by cottonwoods and red alders growing on the island and in the wetlands directly north of the project. Eagles are known to perch and forage on and near the PMEC site [Anchor, 2006]. The PMEC site contains a few cottonwoods that might be used for perching to views the Columbia River and wetlands north of the PMEC site. Eagles also stand on the ground near the Columbia River's edge when feeding on caught prey. Eagles land on gravel and sand bars in the Kalama River to feed on salmon carcasses.

The small wetland lobe is the only suitable habitat for Columbia white-tailed deer on the PMEC site. No Columbia white-tailed deer are documented to use the PMEC site or adjacent wetlands. No deer were observed during the April 2006 field investigation.

Natural Gas Pipeline

The pipeline is proposed to be buried in the Hendrickson Drive and Tradewinds Road rights of way. Properties along the Hendrickson Drive and Tradewinds Road ROW are dominated by industrial and open industrial habitat types or the BNSF/UP rail mainline. These habitat types contain minimal forage, nesting, or roosting habitat to support wildlife. Species observed in these habitats during the field investigation include American robins, crows, sparrows, and killdeer.

The pipeline would be constructed adjacent to three wetlands and across the Kalama River riparian corridor. WDFW (WDFW, 2006) documents these wetlands and riparian areas as priority habitats containing nesting goldeneyes, wood ducks, other cavity nesting birds, great blue herons, redtailed hawks, band tailed pigeons, and geese. These wetlands also provide stopover or overwintering habitat for migrating birds and waterfowl. Species observed in the wetlands and riparian corridor during field investigations includes Canada geese (multiple subspecies), mallards, great blue herons, Swainson's thrush, crows, and a red breasted sapsucker.

No endangered, threatened, or candidate species are documented to nest in or adjacent to the pipeline route. Bald eagles are likely to forage in the wetlands and riparian corridors adjacent to the pipeline route where suitable perch trees are present that provide locations for observation and predation of prey using these areas.

Railroad Spur

The railroad spur alignment is proposed to be constructed northwest from the BNSF rail mainline where it crosses under Kalama River Road to the PMEC site. This alignment passes through a wetland that supports foraging, nesting, and over-wintering habitat for many wildlife species. The April 11, and 12, 2006 field investigations identified belted kingfishers, great blue herons, Canada geese, wood ducks, mallards, red-winged blackbirds, Swainson's thrush, a garter snake, and a bullfrog in the wetland. Evidence of pileated woodpeckers was noted by the common presence of their foraging cavities in standing snags.

WDFW (WDFW, 2006) documents the south half of the wetland as priority habitat containing cavity nesting birds. Field observations confirm the presence of active nesting by wood ducks, mallards, and Canada geese. These wetlands also provide stopover or over-wintering habitat for migrating birds and waterfowl.

No endangered, threatened, or candidate species are documented to nest in or adjacent to the railroad spur alignment (WDFW, 2006). Bald eagles are likely to perch or forage in the wetland.

3.4.3.2 Impacts

PMEC Site

Construction of the PMEC site would have no adverse impact on terrestrial endangered, threatened, or candidate species. Bald eagles would not be adversely affected by construction at the PMEC site. The nearest eagle nest is greater than 0.5 mile away with trees visually blocking the nest site from light glare and noise. The limited perching and roosting that may occur by eagles on the PMEC site can move to better habitats across the river or directly upstream or downstream of the PMEC site. There is no suitable bald eagle foraging habitat on the PMEC site. Columbia white-tailed deer do not use the PMEC site or the wetlands directly north of the PMEC site. Purple martins do not use the PMEC site, but may nest in cavities or forage over the Columbia River and wetlands north and east of the PMEC site.

Construction of the PMEC would have little or no adverse impact on non-listed species. Construction of the project would reduce foraging, perching and other habitat for the species present, but the amount would be very small compared to abundant suitable habitat available adjacent to the PMEC site and up or down river.

Noise, light, and visual disturbance related to construction of the PMEC site would be temporary and would not exceed existing background levels already present in the area. The existing PMEC site is composed of gravels and sand. Increased traffic from construction would add additional activity and noise that may reduce suitability of adjacent habitat for wildlife. The line of trees along the north edge of the project site may block some noise, light and visual disturbance from construction.

Overall, noise disturbance and air quality related to operation of the PMEC would be similar to existing background levels already present in this industrial vicinity. Light and visual disturbance would locally increase once operation of the PMEC begins. The PMEC site has limited use with random occasional vehicle traffic and periodic railroad traffic all concentrated at the east edge of the PMEC site near Tradewinds Road. In operation, the project would eliminate the open space buffer that the wetlands north of the project currently have from light and visual disturbance.

Natural Gas Pipeline

Construction of the pipeline would not adversely impact endangered, threatened, or candidate species. Bald eagles are the only listed species in the vicinity. Pipeline construction activities near the wetlands and riparian areas would be very short duration with no work being completed in or immediately adjacent to the Kalama River. Temporary disturbance may occur to eagles if pipeline construction occurs during the salmon breeding season when eagles would be selecting for salmon carcasses in the Kalama River. Suitable habitat is available that eagles perched or foraging near the pipeline crossing can move a short distance upstream or downstream from the construction zone without being adversely impacted. No purple martin, deer, or suitable habitat for either species is present in or near the pipeline route.

Most pipeline work is expected to occur within the paved road right of way. In addition, no trees are expected to be removed for construction of the pipeline. Therefore, impacts to migratory birds (under the Migratory Bird Treaty Act of 1918) are not expected from construction of the pipeline route.

No permanent loss of individuals or habitat would occur from construction of the pipeline. All construction would occur within the existing road ROW. Temporary loss of habitat from construction would displace some species of small mammals, garter snakes, and small birds that utilize these marginal quality roadside habitats. These temporary habitat losses would be replanted with native vegetation during the same growing season after construction is completed.

Railroad Spur

Construction of the railroad spur would not adversely impact endangered, threatened, or candidate species. Bald eagles are the only listed species in the vicinity that may use the wetland for foraging. There is sufficient higher quality eagle foraging areas nearby in the Kalama River and Columbia River to offset the loss of foraging opportunity with construction of the rail spur. Several cavity nesting snags are available in the railroad spur wetland suitable for purple martins. The proposed rail spur may remove some snags and live trees depending on the final alignment and width of the rail spur. The rail spur does fill a portion of the wetland that offers suitable forage habitat immediately adjacent to the cavity trees. No deer or suitable deer habitat is present in or near the route.

The railroad spur construction would permanently fill about 3.2 acres of palustrine open water wetland. Filling of this wetland area would decrease the water quality functions of the wetland by altering flow patterns, eliminating water storage capacity that would otherwise help reduce downstream flooding, and eliminating nutrient/pollution removal functions entering the wetland from upstream urbanized areas. Additionally, filling the approximately 3.2 acres of palustrine open water wetland may permanently change the habitat and hydrologic functions of an additional approximately 5.6 acres of wetland habitat. This additional wetland habitat supports breeding amphibians and nesting waterfowl, including wood ducks, mergansers, geese and other species of waterfowl and cavity nesting birds that require open water connected to the nest site. Filling the approximately 3.2 acres of wetland would reduce by more than half the available open water rearing habitat that young ducks and geese born in the forested and shrub portions of this wetland area rely on for foraging and protection from predators until the young can fledge and move to other nearby habitats. A total of about 8.8 acres of wetland habitat would be lost or permanently altered by changes in hydrology and loss of foraging, shelter, and nesting/rearing opportunity.

3.4.3.3 Mitigation Measures

PMEC Site

Best management practices would be used to minimize the temporary construction impacts. Dust reduction measures would be implemented to reduce airborne particulate matter during construction. Permanent impacts related to light pollution during facility operation would be mitigated with the installation of shielded lighting fixtures that direct light away from the wetland north of the PMEC site. Permanent impacts related to noise and visual disturbance during facility operation would be mitigated with installation of a buffer of trees and shrubs along the north edge of the property between the fence and wetland to the north.

Natural Gas Pipeline

Best management practices would be used to mitigate for temporary construction impacts. Wildlife habitat along the pipeline corridor would be restored to preconstruction conditions. The top eighteen inches of soil would be replaced using uncompacted clean native topsoil and native herbaceous vegetation. Hanging the pipe from the Hendrickson Drive bridge or using HDD under the wetlands and riparian areas associated with the Kalama River crossing would avoid temporary construction habitat loss and therefore, requires no mitigation measures.

Mitigation for habitat function losses related to permanent clearance requirements along the pipeline right-of-way parallel to the railroad would be addressed as part of the wetland mitigation required for the railroad spur impacts. Mitigation measures would be taken in wetland areas in order to preserve wildlife habitat (See 3.5.3, Wetland mitigation measures).

Railroad spur

Mitigation for losses associated with the approximately 5.6 acres of wetland habitat and habitat functions would be addressed in conjunction with required compensatory wetland mitigation for the 3.2 acres of permanent wetland loss from the railroad spur construction (See. 3.5.3, Wetland mitigation measures). The wetland mitigation project would address the wildlife habitat quality and functions being lost by providing cover, forage, and breeding areas for amphibians, small mammals, and various guilds of birds, particularly cavity nesting species.

3.5

WAC 463-60-333 Natural Environment—Wetlands.

The application shall include a report for wetlands prepared by a qualified professional wetland scientist. For purposes of this section, the term "project site" refers to the site for which site certification is being requested, and the location of any associated facilities or their right of way corridors if applicable. The report shall include, but not be limited to, the following information:

(1) Assessment of existing wetlands present and their quality. .

(2) Identification of energy facility impacts. The application shall include a detailed discussion of temporary, permanent, direct and indirect impacts on wetlands, their functions and values, and associated water quality and hydrologic regime during construction, operation and decommissioning of the energy facility.

(3) Wetlands mitigation plan. The application shall include a detailed discussion of mitigation measures, including avoidance, minimization of impacts, and mitigation through compensation or preservation and restoration of existing wetlands, proposed to compensate for the direct and indirect impacts that have been identified. The mitigation plan shall be prepared consistent with the Department of Ecology Guidelines for Developing Freshwater Wetlands Mitigation Plans and Proposals, 1994, as revised. .

(4) Federal approvals. The application shall list any federal approvals required for wetlands impacts and mitigation, status of such approvals, and federal agency contacts responsible for review.

[04-23-003, recodified as § 463-60-333, filed 11/4/04, effective 11/11/04. Statutory Authority: RCW 80.50.040 (1) and (12). 04-21-013, § 463-42-333, filed 10/11/04, effective 11/11/04.]

SECTION 3.5 WETLANDS
(WAC 463-60-333)

3.5.1 EXISTING CONDITIONS

A wetland reconnaissance and delineation were conducted at the PMEC site and along the pipeline and railroad spur corridors. Field work was completed on April 11 and 12, and August 31, 2006. A wetland report was compiled that details the results of the wetland investigation (URS 2006) and is included as Appendix C to this application.

3.5.1.1 PMEC Site

One wetland lobe of a backwater channel of the Columbia River extends onto the PMEC site along its north edge (Figure 3.4-1). This wetland is a 2.1-acre palustrine emergent wetland dominated by slough sedge (*Carex obnupta*), reed canarygrass (*Phalaris arundinacea*), and yellow flag iris (*Iris pseudacorus*). A sloping upland fringe of black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) is present around the edge of the wetland. The wetland's hydrology is controlled by the tidal elevation of the Columbia River. This wetland is a moderate to high functioning wetland for habitat, water quality, and flood/erosion control. The total extent of this wetland, including the areas outside the scope of this application, is described in detail in Anchor Environmental's *Draft Wetland Mitigation Plan – Port of Kalama North Port Site Development Project* (Anchor Environmental 2006).

3.5.1.2 Natural Gas Pipeline

Three wetland complexes are adjacent to the pipeline corridor (URS 2006). The first wetland is situated between Hendrickson Drive and the Columbia River directly south of an existing rail yard (Figure 3.4-1). It contains palustrine emergent and palustrine scrub-shrub communities. The emergent community is dominated by reed canarygrass and the scrub-shrub community contains multiple species of willow (*Salix* spp.), reed canarygrass and yellow flag iris. The wetland sits in a depression surrounded by development to the north and south, Hendrickson Drive on the east, and a levee on the west that prevents flooding from the Columbia River. The wetland does not have a direct surface water connection with the Columbia River, and it is undocumented whether there may be a groundwater interaction related to tidal changes in the Columbia River. Port of Kalama staff explained this wetland has a culvert leading under Hendrickson Drive to a ditch that drains to the Kalama River, but no culvert or ditch connection could be located during field investigations. This wetland is a moderate functioning wetland for habitat and water quality but rates low for flood/erosion control.

The second and third wetland complexes are in the riparian corridors associated with the Kalama River (Figure 3.4-1). On the north side of the river is a large palustrine forested wetland dominated by black cottonwoods and Oregon ash (*Fraxinus latifolia*). This wetland is bordered by the BNSF railroad to the east, the Kalama River to the south and west, and Tradewinds Road to the north. Wetland hydrology is directly influenced by the high groundwater table and occasional flooding of the adjacent Kalama River. This wetland is a high functioning wetland for habitat, water quality, and flood/erosion control.

The third wetland is a crescent shaped complex located on the south side of the Kalama River. It is bounded by the river to the north and a levee to the south built by the Port of Kalama to retard the Kalama River's flood waters. It is a palustrine emergent and scrub-shrub wetland dominated by black cottonwoods, redosier dogwood (*Cornus sericea*), multiple willow species, hardhack (*Spiraea douglasii*), red elderberry (*Sambucus racemosa*), and reed canarygrass. The wetland's hydrology corresponds with the Kalama River's hydroperiod. This wetland is a high functioning wetland for habitat, water quality, and flood/erosion control.

3.5.1.3 Railroad Spur

One 8.8-acre palustrine forested/scrub-shrub/open water wetland complex is present within the rail spur alignment (URS 2006). It is confined by developed lands to the west and north, the BNSF railroad to the east, and Tradewinds Road to the south (Figure 3.4-1). This wetland has an altered hydrology due to a partially blocked outlet culvert at the north end of the wetland. The blocked outlet and excess ponding of water in the wetland has significantly altered the vegetation communities present in the wetland. Historic aerial photos illustrate that Wetland A was dominated by a small palustrine emergent community and extensive palustrine scrub-shrub and palustrine forested communities. Current hydrologic conditions have resulted in large open water and aquatic bed communities, a smaller scrub-shrub community, and a limited forested wetland community. The dominant plant species include reed canarygrass, redosier dogwood, Sitka willow (*Salix sitchensis*), Pacific willow (*Salix lucida* ssp. *lasiandra*), black cottonwood, and Oregon ash. Several standing snags indicate that the forested portion of the wetland was larger than its current size. This wetland has a high functions rating for habitat, water quality, and flood/erosion control.

3.5.2 IMPACTS

3.5.2.1 PMEC Site

One wetland, a backwater channel of the Columbia River, is located along the north edge of the PMEC site. As part of their long range development plans, the Port of Kalama is proposing to permanently fill this 2.1-acre wetland (Anchor Environmental 2006). Impacts to this wetland are being addressed under a separate application being filed with the U. S. Army Corps of Engineers by the Port of Kalama of Kalama, Washington.

3.5.2.2 Natural Gas Pipeline

Construction of the natural gas pipeline is not expected to impact wetland and riparian habitat. The pipeline would be constructed within the existing road right-of-way for most of its length. The pipeline and its associated work zone would remain outside the fence that protects the wetland between Hendrickson Drive and the Columbia River just south of the existing rail yard. The proposed route would follow Hendrickson Drive north and a constructed levee west around the Kalama River's south shore. It would be either hung over the Kalama River using the existing Hendrickson Drive bridge or drilled under the river at the same location. From the bridge, the pipeline would continue along Hendrickson Drive to the PMEC site. This route would avoid any wetland impacts to the riparian wetland on either side of the Kalama River and the 8.8-acre wetland just southeast of the PMEC site.

3.5.2.3 Railroad Spur

Construction of the railroad spur as proposed would permanently fill about 3.2 acres of palustrine wetland associated with the 8.8-acre wetland complex southeast of the proposed PMEC site. Filling a portion of this wetland complex and rerouting existing culverts draining to the wetland would also impact the remaining approximately 5.6 acres of scrub-shrub and forested communities. Impacts include reducing habitat and water quality functions, increasing the potential for excess flooding or dewatering of the remaining wetland, and reducing use by waterfowl that select these vegetation community associations.

If the blocked culvert outlet for this wetland were to be cleared for this project or as part of regular port or railroad maintenance, the structure and functions of this wetland would be significantly altered. Flood prevention capacity would be reduced. Water quality may increase as the area of palustrine open water wetland shifts to a vegetated cover class. Habitat structure and function would change potentially shifting the vegetation and resident wildlife composition and use of the wetland. The resulting acreage impacts from the rail spur would not change, but the functions impacts would change. In particular, decreased ponding in the wetland would reduce potential waterfowl breeding that relies on open water adjacent to cavity nests.

3.5.3 MITIGATION MEASURES

Impacts associated with the activity under consideration will be mitigated by applying the mitigation sequence shown below. This sequencing approach to mitigation alternatives is described in a Memorandum of Agreement between the Environmental Protection Agency and the Department of the Army (Corps of Engineers, 1990). The actions listed below are in order of preference where all forms of the more preferred mitigation (i.e. avoidance) must first occur in the planning process before the less preferred forms of mitigation (i.e. compensation).

- ***Avoidance:*** Impacts to wetlands will be avoided by locating most construction areas outside of delineated sensitive areas including wetlands, streams, and buffers.
- ***Minimization:*** Unavoidable impacts to wetlands will be minimized by locating construction zones within wetlands and wetland buffers as little as is practicable. In addition, Best Management Practices will be used during construction to prevent the discharge of fill material in wetlands and streams.
- ***Rectification:*** Any unintentional, unauthorized impacts to sensitive areas that may occur during construction will be repaired and rehabilitated as appropriate. Temporarily disturbed areas can be reverted to pre-construction conditions if impacts are not very extensive.
- ***Compensation:*** Unavoidable impacts to wetlands will be compensated by preserving, enhancing, and expanding on-site wetland areas that will not be directly impacted by the proposed construction.

Permanent impacts to about 3.2 acres of wetlands will be mitigated by the creation and/or enhancement of wetlands at a location set aside by the Port of Kalama or by implementing a stream restoration project in the lower Kalama River watershed. Discussions with the U. S.

Army Corps of Engineers, Washington Department of Ecology, and Cowlitz County will be used to develop a conceptual wetland mitigation plan.

3.6

WAC 463-60-342 Natural Environment - Energy and Natural Resources.

(1) Amount required/rate of use/efficiency. The application shall describe the rate of use and efficiency of consumption of energy and natural resources during both construction and operation of the proposed facility.

(2) Source/availability. The application shall describe the sources of supply, locations of use, types, amounts, and availability of energy or resources to be used or consumed during construction and operation of the facility.

(3) Nonrenewable resources. The application shall describe all nonrenewable resources that will be used, made inaccessible or unusable by construction and operation of the facility.

(4) Conservation and renewable resources. The application shall describe conservation measures and/or renewable resources which will or could be used during construction and operation of the facility.

(5) Scenic resources. The application shall describe any scenic resources which may be affected by the facility or discharges from the facility.

[Statutory Authority: RCW 80.50.040 (1) and (12). 04-21-013, amended and recodified as § 463-60-342, filed 10/11/04, effective 11/11/04. Statutory Authority: RCW 80.50.040. 92-23-012, § 463-42-342, filed 11/6/92, effective 12/7/92.]

SECTION 3.6 ENERGY AND NATURAL RESOURCES (WAC 463-60-342)

3.6.1 INTRODUCTION

The PMEC will consume energy and natural resources directly and indirectly during construction and operation. Direct consumption involves the use of petroleum coke, coal, and startup natural gas as fuel for generating electricity during project operation. Indirect consumption refers to energy expended in the construction and maintenance of the facility by things such as vehicles and tools.

The PMEC generates energy. It will produce many times more energy than is consumed in manufacturing its materials or in its construction. Thus the focus of this section is on the operational aspects of the PMEC rather than the construction activities.

3.6.2 ENERGY REQUIRED

3.6.2.1 Construction

The PMEC will be constructed using materials, such as steel, that require energy for fabrication. Energy will also be required to transport these materials to the project site. Additional energy will be consumed by cranes, trucks, mobile equipment, tools and equipment operated in the actual construction of the facility. Data for energy use during this activity is unavailable. Therefore, the short-term consumption of energy for these construction activities is difficult to measure and likely *de minimus* in quantity. However, such consumption is predominately in the form of electricity, gasoline, and diesel fuel.

Maximum expected electricity demand during construction is 2 megawatts (MW) at 480 distribution voltage during the expected 40 hours per week of construction activity. Electricity use during non working hours will consist primarily of lighting for security purposes. Capacity of the existing electric distribution system is adequate for the needs during construction. Should the electric distribution capacity be unavailable, the loss of electric service could be replaced through of the use of self contained construction equipment such as engine driven welders and electric generators.

3.6.2.2 Operation of Facility

The PMEC is an integrated gasification combined cycle facility which will gasify petroleum coke or coal to produce synthesis gas to power two 300 MW combined cycle combustion turbine electric power generating plants.

PMEC will be interconnected to the electric grid through a 230 kV transmission line at the east edge of the plant site. The transmission line connects to the existing BPA Longview Substation utilizing existing Cowlitz County PUD right of way from the PMEC switchyard.

At a 92 percent capacity factor, the PMEC will generate approximately 4.8 million megawatt hours (MWH) of electricity annually and approximately 142 million megawatt hours of electricity over a

30 year operational life. To achieve this generation, the PMEC would consume approximately 1.4 million tons of petroleum coke per year or 2.5 million tons of coal per year. Petroleum coke is a refinery waste product that is exported to Asia to be burned in industrial boilers and furnaces. Natural gas usage would be minimal as it would only be used as a backup fuel supply.

Table 3.6-1 describes an example of annual energy consumption for the PMEC using a 50%/50% mix of solid fuel. It shows the partial offset from the export off-site of 18 million MMBtu/year of electrical energy.

TABLE 3.6-1
ESTIMATED PLANT ENERGY CONSUMPTION
(Based on Average Ambient Conditions)

Energy Type	Estimated Energy Consumption (MMBtu/year)
Coal	23 million
Petroleum Coke	21.5 million
Natural Gas	2 million
Electrical (Net)	18 million
Total Energy Consumption	**28.5 million**

3.6.3 SOURCE AND AVAILABILITY OF ENERGY AND NATURAL RESOURCES

3.6.3.1 Petroleum Coke and Coal

Petroleum coke and coal will be the primary feedstocks for PMEC. Abundant coal supply exists in the Power River Basin and in Western Canada. The PMEC Port of Kalama location is well positioned to take advantage of a growing petroleum coke waste stream due to the increased processing of heavy crude in the West. Heavy crude coking expansion is occurring in California, Montana, Washington, Utah, and Western Canada to triple the current supply of 14 million tons/year over the next five years. PMEC will be in a position to efficiently dispose/process the petroleum coke in an environmentally responsible way. Alternatively, it is burned in non-regulated overseas furnace and boilers with higher emissions than an IGCC plant.

3.6.3.2 Natural Gas

The PMEC will have the capacity to use natural gas as a backup energy source. Williams Pipeline would construct and operate the gas supply pipe from their mainline to the plant site.

The applicant is negotiating a capacity release gas supply contract Because natural gas is intended to be used as a backup fuel supply, it is anticipated that the use would be minimal if used at all during each year, and any needed gas would be purchased on the short-term market.

3.6.3.3 Electric Power

PMEC would supply all its own power needs when operating. Start-up power would be supplied by a backfeed through the interconnection with BPA. Cowlitz County Public Utility District would provide an estimated 2 MW of standby power for times when the plant is out of service for maintenance or other reasons. The ultimate source of electric power to the facility is the emergency diesel generator.

3.6.3.4 Water

The PMEC will have an estimated peak instantaneous water demand of 5,826 gallons per minute (gpm). The annual water usage by PMEC will vary based on the feedstock used and the ambient air temperature, with higher water usage at higher ambient temperatures. The total annual average demand used for design is 9,397 acre-feet per year or 5,826 gpm.

Process water will be supplied from the Port of Kalama, and will be treated as necessary to meet plant specifications. Process effluent will be discharged through the Port of Kalama's discharge line and outfall, which will be upgraded to allow the PMEC's flow.

Potable water will be supplied by the City of Kalama in lines that have already been installed for the site. Sanitary wastewater will be discharged to the Port of Kalama wastewater treatment plant located to the southeast of the PMEC.

3.6.3.5 Materials and Commodities

It is expected that large quantities of construction bulk materials such as soil, aggregate gravel and sand would not be required. Any additional material would be supplied locally from existing quarries. Other building materials, equipment, diesel fuel for the emergency generator and other operational commodities, will be purchased from equipment and material suppliers.

3.6.4 NONRENEWABLE RESOURCES

While a wide variety of natural resources are used in the construction of a project such as the PMEC, the amounts of most are very small. The largest quantities will be steel (coming from iron ore) and concrete (coming from aggregate, sand, and cement quarries and pits). Diesel fuel and electricity will also be consumed during construction.

The resources consumed during operation will be petroleum coke, coal, and natural gas. A minor amount of various metals, petroleum based lubricants, paints and selected chemicals will be consumed as the plant is operated, maintained and regularly overhauled.

3.6.5 CONSERVATION AND RENEWABLE RESOURCES

Generation from the PMEC will be used by regulated utility owners and sold under long-term contracts. Although it is a baseload resource it is easily dispatchable (i.e., can start and stop fairly easily), and the generation from the PMEC may be used as a back-up resource for utilities with renewable resources such as hydro and wind generated power that can have an uncertain "fuel" supply. Energy Northwest anticipates that the PMEC may not generate power during short periods of extremely low market prices such as during periods of high water run-off when hydro based generation is typically plentiful and inexpensive. Accordingly, availability of power from the

PMEC will serve to strengthen optimization of the renewable and conservation resources of other generators.

By providing additional flexibility to hydro generators, the PMEC may promote conservation of fish and wildlife resources. A study by the Bonneville Power Administration suggests and more recent experience verifies that the northwest region can experience serious electricity shortages if water flows in the Columbia Basin are near historic lows. The population of the western United States continues to grow. Medium forecasts of 2% growth project a need for 1200-2400 MW of firm capacity between now and 2012. The neighboring province of Alberta is also short on winter electrical generating capacity.

The PMEC's location on disturbed land within an operating industrial park on a small footprint will leave existing natural habitat for endangered and threatened species undisturbed.

The PMEC uses petroleum coke and coal, with natural gas as backup fuel, in a highly efficient manner. The PMEC's primary advantage when compared to other solid fuel fossil generating resources is that it generates electricity more efficiently. It takes fewer Btu's (energy) to generate a kwh of electricity in an IGCC facility (8,700 to 9,100 Btu/net kwh) than in a variety of thermal generating facilities 9,000 to 11,000 Btu/kwh for conventional coal plants; 10,500 Btu/kwh for nuclear plants; and 10,000 to 12,000 Btu/kwh for simple cycle combustion turbines). Minimum environmental impact is a hallmark of IGCC combined-cycle systems. Exhaust emissions are low as a result of high quality combustion in the gas turbine.

PMEC provides the region stable, low cost, baseload power in an environmentally friendly way. This replaces low efficiency and high priced options. The PMEC provides benefits because it will emit substantially lower quantities of air pollutants per unit of energy output. The PMEC will help maintain air quality given that some new generation resources must be developed to meet growing energy demand and to replace generation that will be retired. The PMEC technology will have the lowest environmental impact.

3.6.6 SCENIC RESOURCES

The project would be constructed within the Port of Kalama Industrial Park on land that was filled using dredge spoils from the Mt. St. Helens volcanic eruption. Neighboring property to the south contains an industrial facility. The site borders the Columbia River. Across the river to the west is the Oregon site of the decommissioned Trojan Nuclear Plant. There are small residential communities of single family homes both across the Columbia River to the west, and on the hillsides north of the city of Kalama, to the east of the site.

Visible plumes from the cooling tower will occur, but will usually be short and will not obscure visual resources for the area. The PMEC includes a wet cooling system. During daytime hours when the visibility is not obscured by local weather, average condensed plume lengths would be less than 40 m, and less than 30 m in height. (See Appendix B-2 for the complete cooling tower modeling analysis). The potential for PMEC emissions to contribute to "regional" haze in Class I areas (national parks and certain designated wilderness areas) was assessed with a regional air quality model, a realistic treatment of Pacific Northwest meteorology, and EPA recommended procedures for refined regional visibility modeling. The analysis assessed the potential for direct fine particle emissions and secondary aerosols formed from the gases emitted by PMEC to reduce visual ranges in Class I areas. The procedure assumes regional visibility degradation is primarily due to light extinction caused by scattering by fine particles including sulfates and nitrates, and by light absorption from soot particles. Twenty-four hour average extinction coefficients were used as a measure of regional haze. Increased extinction causes reduced visual range. A 5 percent change in extinction was used to indicate a “just perceptible” change to a visual landscape.

The regional haze modeling analysis indicates secondary aerosols potentially formed by emissions from PMEC when fired by Syngas would not affect regional visibility on even the clearest days in Class I areas. (The regional haze modeling analysis is described in more detail in Section 5.1.4.1, Assessment of Air Quality Related Values for Class I Areas).